Foreign aid and economic growth: Does non-linearity matter?

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FOREIGN AID AND ECONOMIC GROWTH: DOES NON-LINEARITY MATTER?

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ABSTRACT

The age-long consensus, in the literature, that lower level of foreign aid contributes positively to growth while higher level contributes negatively due to diminishing return and absorptive capacity issues brings to the fore the need; to investigate the possible non-linear relationship between foreign aid and growth over the period of 1981 and 2017 using threshold analysis approach; and to determine optimal foreign aid threshold for Nigeria. The conventional Augmented Dickey-Fuller (ADF) and Break-point unit root tests were both employed and compared for consistence. The overall findings showed that there exists one threshold upon which growth impact of aid can be felt, implying that the impact of net foreign aids received depends on the level of foreign aids. This therefore justifies the existence of a non-linear relationship between net foreign aids received and economic growth. Specifically, this is attributed to the fact that productive sectors of economy are not armed with enough liquidity and by implication the role of domestic investment in output growth is undermined. Similarly, results showed that the only significant determinant of growth in Nigeria is government final consumption expenditure, implying that government spending boosts aggregate demand with positive multiplier effect on output in line with the Keynesian theory. The policy implication from this study: optimal levels of foreign aids above 0.11% of GDP should be considered effective for growth, generated, adhered to, and directed to productive sector of the economy; strong institution, robust financial sector and conducive macroeconomic environment should be built to attract and make efficient use of higher aid flows. Besides, government spending should be biased towards stimulating the productiveness of the non-oil sector in the Nigerian economy.

Keywords: Foreign aid, Economic growth, and Threshold.

JEL Classification: F21, F43, and C22

INTRODUCTION

The concept of official development finance or foreign aid takes root in the Charter of the United Nations adopted during Conference of San Francisco in June 26th 1945. Members were committed to promote social progress and better standards of life in larger freedom, and to employ international machinery for the promotion of the economic and social advancement of all peoples. Rebuilding the world economy destroyed by the Second World War and promoting economic development worldwide has been the main concern of the world leaders since the 1950s. The first foreign aid was provided by the United States to its European allies through the Marshall Plan in the 1950s. The economic motive behind this was that economic recovery, particularly growth, was hampered by the deficiency of productive capacity, and aid affects the level of production by increasing capital stock as well as foreign exchange reserve (Ramiarison, 2010).

Developing countries are often trapped in the vicious circle of poverty as their growth is constrained by low savings and lack of adequate foreign exchanges reserve. Indeed for the majority of developing countries, ex ante investment needs, determined by the Incremental Capital Output Ratio (ICOR), to generate long-run growth cannot always find a source of finance due to insufficient savings. In addition, their exports are limited mainly to primary goods where the terms of trade deteriorate in the long term, exacerbating foreign exchange shortfalls and thereby restricting imports of capital goods. This approach, known as the dual gap model, is used to determine the financing requirement gaps that must be removed in order to achieve the minimum required economic growth rate. Owing to the high risk of

doing business and the imperfection of international capital market, poor countries find it difficult to attract private capital and to borrow on international markets. Consequently, foreign aid is considered as the appropriate means to ease these constraints by providing investible resources to supplement domestic savings (Ramiarison, 2010).

Similarly, developing countries, such as Nigeria, have been found to lack the necessary absorptive capacity to make good use of foreign aid inflows. In the literature (see Agbloyor, Abor, Adjasi and Yawson (2014), Adeniyi, Omisakin, Egwaikhide and Oyinlola (2012), Ramiarison (2010), Durham (2004), Feeny and McGillivray (2009), Clemens, Radelet, Bhavnani, and Bazzi (2004), and Easterly, Levine and Roodman (2004)), the absorptive capacity is defined in terms of advanced technology, modern infrastructure, the necessary human capital, financial sector development, some degree of complementarity between foreign aid and domestic investment, and stable political and macroeconomic environments, to attract and make efficient use of aid flows. According to Ramiarison (2010), the absorptive capacity issues have two major implications, on the one hand, a relatively high level of aid inflows is more likely to lead to Dutch disease, weaker institutions, diminishing returns, low tax efforts, high level of consumption, low investment, large current account deficit, widening saving and foreign exchange gaps, and high aid dependency. On the other hand, country-specific strategies are needed to address these constraints at the first place before increasing aid inflows, and Harrod-Domar model (dual gap model) was not sufficient to determine the amount of aid to be given to a particular country. Being strongly motivated in pursuing self-interests, aid donors often bypass the absorptive capacity issue and tend to give aid irrespective of recipient's absorptive capacity.

In addition, there is a growing amount of literature (see Feeny and McGillivray (2009), Burnside and Dollar (2000), Collier and Dollar (2002), Collier and Hoeffler (2004) and Pattilo, Poirson and Ricci (2002)) on the newly discovered non-linear or *"inverted U-shaped"* relationship between foreign aid and economic growth. This finding indicates that there are diminishing returns to foreign aid due to recipient country having absorptive capacity constraints. The inverted U-shaped relationship between foreign aid and growth implies that at higher levels of aid, the marginal rate of return of aid on growth may fall to zero, or to less than zero, since recipients of foreign aid, mostly developing countries, are unable to use such large aid flows productively (Feeny and McGillivray, 2009).

Furthermore, the next strand of argument is the possibility of macroeconomic variables having structural breaks and outliers. As Perron (1989) once said, "the series that were found to be non-stationary using the conventional unit root test (ADF) might turn out to be stationary around a deterministic trend usually attributed to a one-time shock such as recession, financial crisis, and oil price shock, among others." The advantages of unit root test that allow for structural breaks are two-fold: *first*, it prevents yielding a test result which is biased towards non-rejection as suspected by Perron (1989), and *second*, since this procedure (that is, breakpoint unit root test) can identify when possible presence of structural break occurred, then it would provide valuable information for analyzing whether a structural break on a certain variable is associated with a particular government policy, economic crises, war, regime shifts or other factors (Glynn, Perera and Verma, 2007). Hence, the need for a unit root test that allows structural breaks.

The present study contributes to the literature by investigating whether the relationship between foreign aid and growth in Nigeria is linear or nonlinear and ascertaining the possible cause if the relationship eventually turns nonlinear. The

paper is structured as follows: Section two discusses theoretical issues; section three contains a review of empirical literature; Section four discusses the methodology and results of empirical analysis; section five concludes the study.

THEORETICAL ISSUES

The Two-gap model of foreign aid was first developed by Chenery and Strout (1966) who identified the need to attract foreign capital, mostly foreign aid, to fill two gaps, namely; savings gap and foreign exchange gap. The savings gap is the excess of domestic investment opportunities over domestic savings, causing investments to be limited by the available foreign exchange. The other gap, foreign exchange gap or constraint exists if a country supplies more foreign exchange to the rest of the world through imports than it receives foreign exchange from the rest of the world through exports. The result is the shortage of foreign exchange to import the inputs necessary for domestic production; hence the need to attract foreign capital to fill the foreign exchange gap.

The savings gap and foreign exchange gap can be derived from a typical open-economy national income accounting identity as follows:

Given that:

$$Y = C + I + G + X - M \qquad (1)$$

Where Y is output/income; C is consumption; I is investment; G is government expenditure; X is exports and M is imports, such that (X-M) represents net exports.

Subtracting C and G from both sides gives,

$$Y - C - G = I + (X - M) \qquad (2)$$

Where the left-hand side expression is the closed-economy national savings (which is the sum of private and public savings), that is,

$$S^N = S^{PR} + S^{PU} \quad (3)$$

$$S^N = (Y - T - C) + (T - G) = Y - C - G \quad (4)$$

Therefore, eq. (2) becomes,

$$S^N = I + (X - M) \quad (5)$$

Subtracting investment (I) from both sides and multiplying by (-1), we have,

$$I - S^N = (M - X) \quad (6)$$

From eq. (6), the left-hand side expression is the **savings gap** while the right-hand expression is the **foreign exchange gap**. Since both gaps are mutually exclusive foreign aid is required to fill them, that is,

$$I - S^N = F \quad (7)$$

$$(M - X) = F \quad (8)$$

Equivalently, eq. (8) and eq. (9) can be rewritten as:

$$I - S^N = (M - X) = F \quad (9)$$

Where F is the required amount of foreign aid.

When domestic investment (I) exceeds domestic savings (S^N), the domestic economy needs foreign aid to augment domestic savings so as to finance the required amount of investment. In this wise, foreign investors lay claims to future returns on domestic assets. The inflow of foreign capital can be in form of foreign direct investment, foreign portfolio investment and foreign remittances. On the other hand, when the country imports more than it exports, it requires some amount of foreign exchange to finance its import bill not covered by its export proceeds. The inflow of foreign exchange can be in form of foreign aid and grants, and external debts. Savings gap is prevalent in mostly developing countries which are capital-scarce, and therefore require some form of foreign capital to augment the little domestic savings. Also, these countries are usually faced with foreign exchange

constraints because they rely mostly on primary product exports which command low prices on the global market.

Moreover, the Harrod-Domar growth model corroborates the Two-gap model by Chenery and Strout (1966) by emphasizing that countries experiencing a shortage in savings relative to investment should seek external capital in form of foreign aid or foreign private investment (that is, foreign direct investment and foreign portfolio investment) to fill the so-called investment-savings gap (Todaro and Smith, 2012). The Harrod-Domar growth model postulates that a positive relationship between savings and economic growth on the one hand, and a negative relationship between capital-output ratio and output growth. The model gave no role to labour force and technological progress later introduced and explained as determinants of output growth by the neo-classical and the endogenous growth models, but it was able to identify the constraints faced by poor countries in their pursuit of development objectives since they have relatively low level of capital formation resulting from their low savings strength. The Harrod-Domar model, therefore, posits that poor countries can seek alternative ways of financing domestic investment by not only mobilizing more savings locally, but by also resorting to external ways of financing domestic investment so as to achieve their set development goals. Hence, the conclusion of seeking external capital in form of foreign aid brings to the fore the need to examine the extent to which aid can cause growth.

REVIEW OF THE EMPRICAL LITERATURE

Kolawole (2013) examined the impact of FDI and Official Development Assistance (ODA) on growth in Nigeria, using the Two-Gap model framework capturing the period 1980-2011. Results showed that while FDI impacts on growth negatively, ODA has no effect on real growth in Nigeria. A possible explanation

behind the latter result might be that the bulk of foreign assistance meant for infrastructural development in the country were either siphoned or channeled to unproductive uses. Amassoma and Mbah (2014) also examined the linkage between foreign aid and economic growth in Nigeria over the period 1981-2012 and found that foreign aid has a negative and non-significant impact on Nigerian economy thereby generating adverse effect on Nigeria's economic growth on the ground of weak institution. The insignificant result was attributed to unproductive use of the aid.

Orji, Uche, and Ilori (2014) investigated the implications of four different types of foreign capital inflows, namely, FDI, Official Development Assistance (ODA), foreign portfolio investment, and remittances on output growth of West African Monetary Zone (WAMZ) over the period 1981-2010. The WAMZ countries captured in the study include, Nigeria, Liberia, Ghana, Gambia, Sierra Leone and Guinea. Their results showed that more than one form of foreign capital flows (mainly, FDI and ODA) contributed positively to output growth in Nigeria, whereas only ODA contributed positively to output growth in Sierra Leone and Ghana. It was also found that FDI was more growth enhancing in Nigeria and Gambia. Lastly, remittances had the highest contribution to growth in Liberia, whereas, none of the flows has positively impacted on the Guinean economy over the study period.

In a study conducted by Ugwegbe, Okafor and Akarogbe (2016), it was found that in the short run, external debt has a positive and insignificant effect on growth, whereas, foreign aid also have a positive and significant effect on growth. The reverse is the case in the long run, where external debt has a positive and significant effect on growth, whereas the effect of foreign aid on growth though, positive, is however not significant. This can be attributed to the fact that the bulk of foreign

aid received is being channeled to meet consumption needs at the expense of productive investments that could stimulate growth.

Saibu and Obioesio (2017) also found that foreign aid impacts economic growth positively, though negligible, whereas the growth effect is systematically conditioned on some factors among which include the quality of policies, the policy climate and quality of institution. Onakayo and Ogunade (2016) investigated foreign aid growth nexus in Nigeria over the periods of 1981 to 2010 and found strong evidence of foreign aid influence on economic growth in the long run but not in the short run. The findings parallel that of Olanrele and Ibrahim (2015), Fasanya and Onakoya (2012), and Nkoro and Furo (2012).

In addition, Burnside and Dollar (2000) examined the relationship among foreign aid, economic policies, and growth of per capita GDP. They found that aid has a positive impact on growth in developing countries with good fiscal, monetary and trade policies, but has little effect in the presence of poor policies. However, Easterly, Levine and Roodman (2004) replicated the study by Burnside and Dollar (2000) by extending the data end from 1993 to 1997 while retaining the latter's methodology. The authors did not find that aid promotes growth in good policy environment, in contrast, to the results obtained by Burnside and Dollar (2000). Also, Aurangzeb and Stengos (2010) in their investigation of aid-growth relationship in developing countries found no evidence that aid works better in better policy or geographical environments. They however found strong evidence that magnitude of aid is important for spurring the economic growth in recipient countries. Clemens et al (2004), on their own part, found that aid causes some degree of growth in recipient countries, though the magnitude of this relationship is modest, varies greatly across recipients, and diminishes at high levels of aid.

This paper investigates whether or not nonlinearity matters in the relationship between foreign aid and growth in Nigeria and possibly ascertains cause of those nonlinearities. It also offers a new approach in its investigation drawing evidence from the Nigeria. Most studies examined the non-linear relation between foreign aid and economic growth using quadratic or interactive terms.[1] This study differs from previous studies by employing the threshold regression to estimate the aids threshold and also to determine the presence of non-linearity in the nexus between foreign aids and output growth in Nigeria.

Methodology and Data Issues

Model Specification

To investigate the presence of nonlinearities in the relationship between foreign and growth, this study adopts the threshold regression approach proposed by Hansen (1999) to time-series analysis of the Nigerian economy. Assume initially that the foreign aid-growth relation is specified in a linear regression model as below.

$$LRGDP_t = \alpha_0 + \alpha_1 AID_t + \beta' Z + \varepsilon_t \quad (10)$$

Where $LRGDP$ is the natural log of real GDP (a proxy for economic growth), AID is net foreign aid received (% of GDP), Z is a vector of control variables including gross capital formation government, final consumption expenditure and trade openness index and, $\alpha_0, \alpha_1, \beta$ are regression parameters, and ε is the stochastic error term while subscript t is the time dimension.

Following the threshold framework developed by Hansen (1999), eq. (10) becomes

$$LRGDP_t = \alpha_0 + \alpha_1 X_t I(AID_t \leq \gamma) + \alpha_2 X_t I(AID_t > \gamma) + \beta' Z + \varepsilon_t \quad (11)$$

[1]Examples are Burnside and Dollar (2000), Collier and Hoeffler (2004), Clemens et al (2004), Easterly et al (2004), Levine and Roodman (2004), Feeny and McGillivray (2009), among others.

Where AID is the threshold variable and it is used to test for the presence of threshold effect of net foreign aid received on growth, γ denotes a threshold parameter. $I(.)$ is an indicator function that takes the value of 1 if AID is below a determined threshold value (γ) and 0 otherwise.

Eq. (11) can conveniently be divided into two regimes depending on whether the threshold variable is above or below the estimated threshold. The two regimes are distinguished by different regression slopes α_1 and α_2 in two equations as follows.

$$LRGDP_t = \alpha_0 + \alpha_1 X_t + +\beta' Z + \varepsilon_t \text{ if } AID_t \leq \gamma \quad (12)$$

$$LRGDP_t = \alpha_0 + \alpha_2 X_t + +\beta' Z + \varepsilon_t \text{ if } AID_t > \gamma \quad (13)$$

Where eq. (12) represents the regime below the threshold, while eq. (13) describes the regime above the threshold. The vector of control variables (Z) is regime invariant.

Additionally, there is need to identify the aid threshold and test for its presence. In order to identify the threshold, the first step eq. (11) is estimated by ordinary least squares (OLS). Then, the sum of squared errors (S_1) is computed for all possible values of the threshold variable (net foreign aids received in the present case), where $S_1 = \hat{\varepsilon}(\gamma)'\hat{\varepsilon}(\gamma)$. In the second step, the threshold parameter is obtained by minimizingS_1, such that $\hat{\gamma} = argmin\gamma\ S_1(\gamma)$. Similarly, once the endogenous threshold is estimated, it is essential to test whether the threshold effect is statistically significant. The null hypothesis is that there is no threshold effect, that is,

$$H_0: \beta_1 = \beta_2 \quad (14)$$

The null hypothesis implies that the slope coefficients are equivalent in the two regimes. Therefore, under the H_0, the threshold model (eq.(11)) is equivalent to

the linear model (eq.(10)). The likelihood ratio test of the null hypothesis is based on the F-statistic:

$$F_1 = (S_0 - S_1(\hat{\gamma}))\Big/\widehat{\sigma^2} \quad (15)$$

Where S_0 and S_1 are the sum of squared errors under the null and alternative hypotheses, while $\widehat{\sigma^2}$ is the estimate of the regression error variance (σ^2). Given that the threshold value is not identified under the null hypothesis, the asymptotic distribution of F_1 is not standard. As a solution, Hansen (1999) proposed a bootstrap method to simulate the probability value for the F-statistic (F_1).

DATA SOURCES

The data on relevant variables employed in this study, such as, real GDP (a proxy for economic growth), net foreign aids received (% of GDP), and other growth determinants including gross capital formation (a proxy for domestic investment), government final consumption expenditure and trade openness were collected from the World Bank's World Development Indicators (WDI, 2017) over the period of 1981 and 2017.

EMPIRICAL RESULTS AND DISCUSSION

Here, the results of preliminary analysis including descriptive statistics and unit root test are presented. This section also discusses the Threshold regression results.

Descriptive Statistics

Table 1 presents the summary statistics on the main variables used in the study over the period of 1981 to 2017. The average value of real GDP (log-levels) is approximately 26.03. Other variables including net foreign aids received (% of

GDP), gross capital formation (% of GDP), government final consumption expenditure and trade openness have their respective means as 0.61%, 3.65%, 37.11% and 32.24%. In terms of volatility as measured by the coefficient of variation of each variable, net foreign aids received was the most volatile while the natural log of real GDP is the least volatile. In terms of the shape of the probability density of each variable as accounted for by Jarque-Bera statistic, all variables, except the natural log of real GDP and trade openness, follow normal distribution ($p > 0.1$). Despite that the majority of the variables are well-behaved statistically, it is important to check the stationarity status of the variables, the issue which is addressed in the next section.

Table 1: Summary Statistics

Variable	Obs.	Mean	Standard deviation	Coefficient of variation (%)	Jarque-Bera statistics
LRGDP	37	26.034	0.492	1.890	3.749[0.153]
AID	37	0.606	0.923	152.310	344.502[0.000]
GCF	37	37.108	19.291	51.986	6.667[0.036]
GCONS	37	3.647	2.896	79.408	5.683[0.058]
TOP	37	32.238	12.737	39.509	1.892[0.388]

Source: Authors' computation, 2019.

The Unit Root Test Results

The results of the conventional Augmented Dickey-Fuller (ADF) unit root test and Break-point unit root test are shown in Table 2. Here, only test regressions that are close to rejecting the null hypothesis of nonstationarity are reported. Based on the ADF test, it can be observed that net foreign aids received and gross capital formation are stationary at levels; hence, they are said to be integrated of order zero, that is, I(0). Meanwhile, other variables including the natural log of real GDP, government final consumption expenditure and trade openness become stationary

after first differencing; hence, they are said to be integrated of order one, that is, I(1). However, accounting for either intercept or trend breaks in the ADF test regression makes all variables stationary at levels. Overall, this study takes a cue from the cautionary note pointed out by Perron (1989) that:

> *"a rejection of the null hypothesis of a unit root conditional on the possibility of shifts in the underlying trend function at known dates does not imply that the various series can be modeled as stationary fluctuations around a completely deterministic breaking trend function; as a matter of general principle, a rejection of the null hypothesis does not imply acceptance of a particular alternative hypothesis."*

Table 2: Results of Unit root Tests

	Conventional ADF Unit Root Test			**Breakpoint Unit Root Test**		
Variable	**Level**	**First Difference**	**(d)**		**(d)**	**Break dates**
LRGDP	-1.488[a]	-3.672**[a]	(1)	-5.046**[i]	(0)	2001
AID	-4.259***[a]	----------†	(0)	-7.066***[i]	(0)	2008
GCF	-3.889***[c]	----------	(0)	-7.189***[t]	(0)	2014
GCONS	-2.555[a]	-5.358***[a]	(1)	-5.732***[i]	(0)	2003
TOP	-2.202[b]	-7.376***[b]	(1)	-4.346*[t]	(0)	1998

Note: ***, ** indicate the rejection of the null hypothesis of a unit root at 5% and 10%, respectively; I(d) is the order of integration and it refers to the number of differencing required for a series to become stationary; †implies that a series that is stationary at levels does not require its first difference being reported; Superscripts a, b and c denote model with intercept and trend, and model with intercept only and model with none, respectively. Superscripts i and t represent break specification for intercept only and trend only. The break dates were determined endogenously using Dickey-Fuller t-stat.

Source: Authors' computation, 2019.

Threshold analysis of foreign aids-growth nexus

Table 3 presents the results of threshold estimates of the impact of net foreign aids received on economic growth after accounting for other determinants including gross capital formation, government final consumption expenditure and trade openness.

Contrary to expectations, there is a significant negative relationship between gross capital formation and economic growth across the two regimes of foreign aids. For every one percentage point in gross capital formation, real GDP declines on average by 2.3% keeping other variables constant. The implication of this is that since the productive sectors are not armed with enough liquidity, the role of domestic investment in output growth is undermined. Government final consumption expenditure has a positive impact on growth. A 1 percentage point increase in government final consumption expenditure leads on average to a 5.2% increase in real GDP keeping other variables constant. The coefficient is statistically significant at the 1% significance level, implying that government spending boosts aggregate demand with positive multiplier effect on output in line with the Keynesian theory. There is an expected negative relationship between trade openness and output growth. For every one percentage point in openness index, real GDP falls on average by 0.4% keeping other variables constant. The impact coefficient is however not statistically significant at the 10% level. Nonetheless, the result suggests the vulnerability of the Nigerian economy to external shocks due to its heavy reliance on crude oil proceeds.

Moreover, the null hypothesis of a linear relation between net foreign aids and growth is rejected since the Bai-Perron scaled F-stat exceeds the 5% critical level. The test showed that there exists one threshold, implying that the impact of net

foreign aids received depends on the level of foreign aids. This therefore justifies the existence of a non-linear relationship between net foreign aids received and economic growth. It is observed that net foreign aids below the estimated threshold of 0.11% of GDP are not considered sufficiently enough to spur growth. Meanwhile, levels of foreign aids above this threshold are considered effective to stimulate output growth.[2] The insignificance of the associated impact coefficient at the 10% level implies that Nigeria requires appropriate policies and institutions that would help improve the impact of foreign aids on real GDP growth. In addition, based on the adjusted coefficient of determination and F-statistics, the overall threshold model of growth is significant at the 1% level with the explanatory variables (growth determinants) jointly accounting for approximately 88% of total variation in growth.

Table 3: Threshold regression of the nexus between net foreign aids received and growth

	Regime 1: $(AID_t < \gamma)$	Regime 2: $(\gamma \leq AID_t)$
AID_t	-33.403***(8.431)	0.022 (0.032)
GCF_t	-0.023***(0.003)	-0.023***(0.003)
$GCONS_t$	0.052***(0.015)	0.052***(0.015)
TOP_t	-0.004 (0.003)	-0.004 (0.003)
C	28.258***(0.514)	26.746***(0.210)
	Estimated threshold (γ) = 0.11	
Adj. R^2	0.879	
F-stat	46.075[0.000]	
Bai-Perron scaled F-stat = 16.472	5% critical value = 11.47	

Note: ***, ** indicate the statistical significance of coefficients at 1% and 5%, respectively; the values in parentheses and block brackets are, respectively, the standard errors and the probabilities.

[2]This result parallels the findings of Feeny and McGillivray (2009), Aurangzeb and Stengos (2010) that the relationship between aid and growth is non-linear. It however contradicts the findings of Kolawole that foreign aids had no significant impact on growth.

Source: Authors' computation, 2019.

CONCLUSION AND POLICY RECOMMENDATION

The study has so far investigated the possible nonlinear relationship between foreign aid and economic growth in Nigeria between 1981 and 2017 using the threshold regression analysis approach. The conventional Augmented Dickey-Fuller (ADF) and Break-point unit root tests were both employed and compared for consistence. The overall findings showed that there exists one threshold upon which growth impact of aid can be felt, implying that the impact of net foreign aids received depends on the level of foreign aids. This therefore justifies the existence of a non-linear relationship between net foreign aids received and economic growth. The cause of nonlinearity is attributed to the fact that productive sectors of economy are not armed with enough liquidity and by implication the role of domestic investment in output growth is undermined. Similarly, results showed that the only significant determinant of growth in Nigeria is government final consumption expenditure, implying that government spending boosts aggregate demand with positive multiplier effect on output in line with the Keynesian theory. This result parallels the findings of Feeny and McGillivray (2009), Aurangzeb and Stengos (2010) that the relationship between aid and growth is non-linear. It however contradicts the findings of Kolawole that foreign aids had no significant impact on growth.

The policy implication, based on these findings, is that optimal levels of foreign aids above 0.11% of GDP should be considered effective for growth, generated, adhered to, and directed to productive sector of the economy; strong institution, robust financial sector, stable political and conducive macroeconomic environment should be built in to attract and make efficient use of higher aid flows. Besides, government spending should be biased towards stimulating the productiveness of the non-oil sector in the Nigerian economy. Researchers that are

interested in carrying out similar study on the Nigerian economy should try to identify a mechanism through which aid is generated.

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APPENDIX A

Table 5: Data on Natural log of real gross domestic product (LRGDP), Net foreign aid received (AID), Gross capital formation (GCF), Government final consumption expenditure (GCONS) and Trade openness

YEAR	LRGDP	AID	GCF	GCONS	TOP
1981	25.60148041	0.023863779	89.38105309	1.776405725	18.17172618
1982	25.53102158	0.024480042	85.93389861	2.106434616	13.77983316
1983	25.41534038	0.048148764	75.75313499	2.077116614	10.04496861
1984	25.40412145	0.044077407	58.94737865	2.091335722	9.380541231
1985	25.46156952	0.042999047	46.39087543	1.939839163	10.39197861
1986	25.46217879	0.106047068	54.95058655	1.929235512	9.135845723
1987	25.49367867	0.128369554	49.98770883	1.632708798	19.49533511
1988	25.56445419	0.2378321	43.64421915	1.55269831	16.94060969
1989	25.58346613	0.781763794	52.48869056	1.315222341	34.18261725
1990	25.69480074	0.472057454	53.18668521	1.220140672	30.92474008
1991	25.69837786	0.525912542	48.40571697	1.220981843	37.02160486
1992	25.74364939	0.54152192	43.77938896	2.0476286	38.22738831
1993	25.72308826	1.039268797	44.48885975	2.148452483	33.71975493
1994	25.7047723	0.560576239	42.08362086	1.769021017	23.05923645
1995	25.70404539	0.47877484	37.23966698	1.166196047	39.52837841
1996	25.74514822	0.369548679	36.62555769	0.911234588	40.25772925
1997	25.77409615	0.366962806	38.47745854	0.912570547	51.46101079
1998	25.79958117	0.372389959	40.6149508	1.375668403	39.27860747
1999	25.80540544	0.255993447	38.34181136	1.383378315	34.45783118
2000	25.85434735	0.250256459	34.10954141	2.123442197	48.99559947
2001	25.9118394	0.226690766	30.92588983	1.990621474	49.68050029
2002	26.05445948	0.314040391	27.58250942	1.340487984	40.03516859
2003	26.12535769	0.29534291	29.38679832	0.951746573	49.33496486
2004	26.21383144	0.424361802	27.11796542	4.787637353	31.89587044
2005	26.27622877	3.634611621	26.18958967	4.54454697	33.05946007
2006	26.33505816	4.841917482	27.86558554	5.125841682	42.5665658
2007	26.39888828	0.710601409	21.24460887	9.448340036	39.33693151
2008	26.46434331	0.383852725	19.8969961	9.428957363	40.79683535
2009	26.54164619	0.561610543	22.04953582	8.649947944	36.05871041
2010	26.6186596	0.564828446	17.562103	8.848100208	43.32075684
2011	26.67037809	0.441069335	16.3605621	8.572152255	53.27795833
2012	26.71180848	0.417124489	14.95882591	8.228177843	44.53236805
2013	26.77639077	0.4885213	14.90390593	7.15521853	31.04885995
2014	26.83757729	0.435990261	15.80270277	6.464486121	30.88519372
2015	26.86375849	0.491634187	15.49010409	6.688120383	21.44692967
2016	26.84745766	0.617371288	15.36673615	5.384281786	20.72251888
2017	26.85548423	0.893900292	15.47432765	4.624482393	26.347599

Source: World Development Indicator (WDI, 2017)