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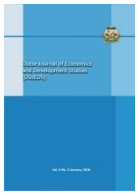
E-Mail: dujeds@fud.edu.ng



FOREIGN AID-DOMESTIC SAVINGS NEXUS: EVIDENCE FROM NIGERIA

IGBINEDION, Sunday Osahon — **Department of Economics and Statistics, University of Benin**

OLELE, Enoh Hilda — **Department of Economics, Delta State University, Abraka, Nigeria.**

Abstract
The paper examined the nexus between foreign aid and domestic savings using Johansen co-integration and error correction modeling in Nigeria, applying time series data for the period 1980-2015. The finding reveals that foreign aid complements (that is, crowd-in) domestic savings in Nigeria; suggesting that the problem of low savings in the economy may most probably be associated with other factors, not foreign aid. Also, results show that strong growth in gross domestic product positively and significantly influence domestic savings, while growth in per capita income fail to significantly promote aggregate national savings due, perhaps, to its subsistence level. Arising from the findings, the study recommends, amongst others, that government policies (such as privatization and other macroeconomic reforms) that could directly or indirectly boost the inflow of foreign aid to Nigeria should be accorded priority in development policy measures. On the domestic front, government could enhance per capita income growth through improvement in education and training as better educated persons earn more income on average compared to persons with little or no education.

Keywords: Foreign Aid, Cointegration, Domestic Savings Economic Growth. Nigeria
JEL Classification: F35, 016

Introduction

Over the past half a century, debates over the impact of foreign aid – defined as the transfer of resources from developed nations to less developed nations, either through bilateral donors or multilateral donors – have been frequent and heated. The central issue has been whether or not foreign aid complements or substitutes to domestic savings.

Those in support of the positive impact of foreign aid on domestic savings (such as Rosenstein–Rodan (1961), Chenery and Strout (1966), Over (1975), Synder (1990), Edwards (1996), Dzogbenu (1996), Ouattara (2003) and Okpanachi (2011) believe that foreign aid helps a country to make up for her insufficient funds and supplements domestic savings, thereby allowing such a country to experience a higher rate of investment which, in turn, promotes faster growth. However, others such as Griffin (1970), Rahman (1968), Weisskopf (1972), Gupta and Islam (1982), Hadjimichael ,Ghura, Muhieisen and Nord (1995), Rajan and Subramanian (2008) and Basnet (2013) have argued that foreign aid tend to displace (that is, substitute domestic savings) and encourage capital flight by reducing the real rate of interest and, in the short-run, cause the exchange rate to appreciate. The debate tends nowhere near a conclusion. Although a vast empirical literature has shed light on the nexus between domestic savings and foreign aid in developing countries, most of such empirical investigations have been conducted using cross-national data of many less developed countries without paying much attention to their differing levels of development and socio-economic and cultural structures. Mosley (1980), Fayissa and El-kaissy (1999), Anoruo and Ahmad (2001), Mavrotas and Kelly (2001) and Moham (2006) applying the results from such cross-national

studies to policy formulation for individual countries may be quite misleading and erroneous. This paper therefore fills this gap by supplementing the relatively scarce country-specific studies on the nexus between domestic savings foreign aid, utilizing error-correction methodology on time-series data for Nigeria.

The remainder of the paper is structured into four sections. Section two provides a brief review of the literature on foreign aid - domestic savings nexus. Section three outlines the methodology employed. Analysis of the regression results are contained in the fourth section, while section five concludes the paper with some relevant policy recommendations.

Literature Review

On the issue of foreign aid-domestic savings nexus, the contention centres on whether foreign aid complements or substitutes domestic savings. In support of complement or early views such as Rosenstein-Rodan (1961) and Chenery and Strout (1966) aver that since developing nations do not have the required savings to finance their investment requirements, foreign aid tend to help bridge the saving-investment gap. In this case, foreign aid helps to complement domestic savings.

On empirical front, Over (1975) using data for 36 developing countries for the two-year period of 1962-1964, observed that a positive and significant relationship exists between foreign aid and domestic savings. Waheed (2003) utilized time series data of the Pakistani economy to examine the nexus between foreign aid and gross national savings. The finding from the study suggests the existence of a positive and significant long-run relationship between foreign aid and domestic savings in the economy.

On the other hand, Griffin (1970), Griffin and Enos (1970), Kibiru (2008),and Sabra and Eltalla (2016) have argued that foreign aid tends to crowd out domestic savings, and thus act as replacements, instead of complementing it. Griffin (1970), using cross-section data for 32 developing nations and 13 Middle East and Asian nations, and annual data for Columbia, the results reveal a inverse relationship between foreign aid and domestic savings. In another study, Weisskopf (1972) investigated the nexus between domestic savings and foreign aid for a sample of 44 developing nations after the war period. The results revealed that foreign aid negatively affects domestic savings, with every unit rise in foreign aid, domestic savings declined by about 0.23 units.

In a related cross-country investigation, Mosley (1980) studied the relationship between foreign aid and domestic savings for 83 emerging countries. The results also confirmed the inverse relationship between domestic savings and foreign aid in those countries, with the reported coefficient of aid being -0.11. White (1992) confirmed the savings displacement hypothesis in a cross-section study of 66 less developed countries. His results indicate that for every 1 percent rise in foreign aid, domestic savings declined by about 0.09 percent.

Time series studies on foreign aid-domestic savings nexus appear not to have produced significantly different results. For instance, Bowles (1987), Morriset (1989) and Reichel (1995), Rajan Subramanian (2008) and Basnet (2013) all tend to lend credence to the view that aid displaces domestic savings in their respective investigations. Study by Razzaque and Ahmed (2000) on the relationship between domestic savings and foreign aid for the Bangladesh economy for the period (1973-1988) using co-integration technique also confirmed the presence of a long-run negative relationship between foreign aid and domestic savings for that economy. The main arguments of most theorists with the view that foreign aid actually discourage domestic savings is that aid-recipient countries often engage in aid-switching; involving increases in government consumption expenditures and reduction in tax-collection drive.

Recently, a study by Angmortey and Tandoh-Offin (2014), using three components of foreign capital inflow, namely foreign aids, foreign direct investment and grants, and foreign commercial borrowing, observed that none of the 3 forms of foreign capital crowd out domestic savings in both the short and long-runs in Ghana.

Methodology

This study on the impact of foreign aid on domestic savings in Nigeria will be premised on two principal theoretical models, namely, the Harrod-Domar (H-D) growth model and the Chenery-Strout two-gap model. The basic H-D growth model assumes a closed economy with no government, no depreciation of existing capital such that all investment is considered as net investment, and all investment (I) derives from savings (S).

Therefore, $S=s(Y)$…… . ……. (1)

and I is defined as the change in capital stock, that is,

$I = \Delta K$ …….……. (2)

$K = kY,$

$\Delta K = k(\Delta Y)$ ……. (3)

Since total national savings, S, must equal total investment, I,

Then $S=I$ ……..…. (4)

Therefore $s(Y) = k(\Delta Y)$ ……..…… (5)

Multiplying both sides of equation (5) first by (1/Y) and then by 1/K gives:

$S/K = \Delta Y/Y$…….(6)

Recall that $\Delta Y/Y$ is same as the rate of growth of GDP. Thus, the rate of growth of GDP ($\Delta Y/Y$) is partly determined by the level of national savings ratio(s) and partly by the national capital-output ratio. Accordingly, the savings gap can be bridged either by foreign aid or private foreign direct investment.

The Chenery-Strout model (1966) focuses generally on the role of external finance in the development process. The two-gap model is predicated on the premise that most developing nations are hindered either by inadequate domestic savings needed to help meet the required level of domestic investment or insufficiency of foreign exchange to meet the importation of intermediate and capital goods. (Todaro and Smith, 2003). At any given point in time, one of the two gaps will be dominant in most developing economies. Whichever of the two gaps is dominant will invariably constrain the size and volume of investment that can be undertaken in the economy with such deficit. Algebraically, the two-gap model can be presented as follows: Consider the basic macroeconomic identity where:

Aggregate Output = Aggregate Expenditure

Assuming an open-economy and one that there is no dominant government sector, hence equation (7) can be specified thus:

$Y = C + I + (X-M)$ ……..……... (7)

Where**:** Y is gross national product; C is consumption; I is investment (or domestic capital formation); X is exports; and M is imports.

Expenditure targets: $Y + M = C + I$ ……...……... (8)

Hence, equation (8) can be rewritten to become equation (9)

$Y – C + M = I + X$ ……...……..... (9)

Since $Y – C = S$

Where S= domestic (public) savings, measured as the difference between public income and expenditure. Therefore, simplifying equation (9) further yields one of the definite identities in modern macroeconomics represented in equation (10):

$S + M = I + X$ ……...……...….(10)
(Leakages) (Injections)

The foregoing relationship can be restated thus:

$M – X = I – S$ ……..…….……(11)

(Foreign Exchange Gap) (Savings Gap)

Note: The analysis in this study rests on the premise that shortfalls or gaps in savings and foreign exchange in equation (11) can be financed by inflow of foreign aids.

Model Specification

Based on the reviewed literature in the previous section, and the theoretical underpinnings, the foreign aid-domestic savings hypothesis is tested in an error-correction modeling (ECM) procedure. Within an ECM technique, the ECM coefficient reveals the speed of adjustment that guarantees the convergence of short-term dynamics with its long-term equilibrium path. From the generalized form in equation (12), the ECM is derived thus:

$$Z_t = \beta_0 + \beta_1 Z_{t-1} + \pi_1 K_t + \pi_2 K_{t-1} + \mu \text{ ……………………………….….(12)}$$

From equation (12), subtract y_{t-1} from both sides; and then adjusting the other autoregressive component x, yields:

$$\Delta Z_t = \beta_0 + (\beta_1 - 1) Z_{t-1} + \pi_1 k_t + \pi_2 k_{t-1} + \mu$$
$$\Delta Z_t = \beta_0 + (\beta_{1-1}) Z_{t-1} + \pi_1 \Delta K_t + (\pi_1 + \pi_2) K_{t-1} + \mu_t$$
$$\Delta Z_t = \pi_1 \Delta K_t - (1 - \beta_1)\left[Z_{t-1} + \left(\tfrac{\beta_0}{1-\beta_1}\right) + \left(\tfrac{\pi_1+\pi_2}{1-\beta_1}\right) + K_{t-1}\right] + \mu_t$$
$$\Delta Z_t = \pi_1 \Delta K_t - \Psi[Z_{t-1} + \left(\tfrac{\beta_0}{1-\beta_1}\right) + \left(\tfrac{\pi_1+\pi_2}{1-\beta_1}\right) K_{t-1}] + \mu_t$$

Hence, we have equation (13)

$$\Delta Z_t = \pi_1 \Delta K_t = \pi_2 \, [ECM] + \mu_t \quad (13)$$

Where: ΔZ_t and ΔK_t stand for the dependent and explanatory variables, respectively, in their first differences (Igbinedion and Ogbeide, 2016).

The study augments equation (13) by including relevant determinants of domestic savings based on extant literature. Let X represents all such variables, that is:

$X_t = (ODA_t, GDP_t, RPCI_t, GFCF_t)$ ………………………………………………… (14)

Therefore, the estimated parsimonious ECM model for this study is specified in equation (15).

$$\Delta SAV_t = \phi_0 + \phi_1 \Delta ODA_{t-3} + \phi_2 \Delta RPCI_{t-2} + \phi_3 \Delta GDP_t + \phi_4 \Delta GFCF_t + \phi_5 ECM_{t-1} \text{......(15)}$$

Where: SAV is Domestic savings; ODA is official development assistance (i.e. foreign aid); GDP is Gross domestic product; RPCI is Real per capita income; and GFCF is Gross fixed capital formation.

The ECM coefficient (δ) is the error-correction term which is expected to be negative. It indicates the speed of convergence to equilibrium once the equation is disturbed. The "Δ" stands for first difference. The model is estimated by the OLS method which is expected to yield consistent estimates provided the variables are stationary (Enders, 1995; Sims, 2013). The study also tested the model for stability.

Model Estimation

The model for this study will be estimated using the ordinary least squares estimation technique as this help to produce best unbiased estimates of the parameters. This will however be preceded by testing for stationarity in the variables using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) procedure. The long-run relationship among the variables will be ascertained using the Johansen and Juselius (1990) approach.

Data Set and Description

This research work utilizes time series data spanning 1980-2015, collected from the Central Bank of Nigeria (CBN) Statistical Bulletin (2015), Annual Report and Statement of Accounts (various issues), the National Bureau of Statistics (NBS) and the National Planning Commission (NPC) (2015) Annual Performance Report of the Nigerian economy.

The descriptive summary statistics of the variables for the study is presented in Table 1. The mean value of domestic savings (SAV), official development assistance (ODA), gross domestic product (GDP), real per capita income (RCPI) and gross fixed capital formation (GFCF) are 1011982, 969.5891, 57263.56, 7123536, and 634727.6 respectively. Evidently, this reveals that the variables under consideration tend to exhibit variations in terms of magnitude, implying that estimating such equations in their levels may produce inconsistent results.

Table 1: Descriptive Statistics

Metrics	SAV	ODA	RPCI	GDP	GFCF
Mean	1011982	969.5891	57263.56	7123536	634727.6
Median	121496.8	205.6400	54320.06	2317966	172983.9
Maximum	6531913	11427.94	81290.94	37543655	4207423
Minimum	5769.900	31.71000	43470.63	47619.70	8799.480
Std. Dev.	1879853	2260.570	10047.52	10710403	1016879
Observations	36	36	36	36	36

Source: Author's Computation

Empirical Analysis

Stationarity Test

It has been observed in the literature that macroeconomic time series are usually non-stationary (Granger and Newbold 1977) and utilizing such non-stationary variables in estimations might lead to spurious outcomes. Policy prescriptions based on such outcomes might be misleading. To avoid this pitfall, we employ the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results are presented in table 2.

Table 2: Unit Root Tests Results

variables	Augmented Dickey-Fuller (ADF) Test			Phillip-Perron (PP) Test		
	Level	1st Difference	Remark	Level	1st Difference	Remark
SAV	-1.324	-6.2720**	I(1)	-1.1017	-6.6114**	I(1)
ODA	-3.0118	-3.0118*	I(0)	-3.9213	-3.9213**	I(0)
RCPI	-1.6481	-5.2533*	I(1)	-0.7189	-5.3231**	I(1)
GDP	-2.0017	-7.8321**	I(1)	-1.8100	-6.9533**	I(1)
GFCF	-1.2556	-6.2257**	I(1)	-2.1516	-8.0471**	I(1)

Note :*(**) denote significance at 5% and 1% respectively.
Source: Author's computation.

The result in table 2 shows that, with the exception of ODA variable that was stationary at level (using both test statistics), all other variables became stationary after first differencing. Besides, while SAV, GDP and GFCF are significant at 1percent level of significance, ODA and RCPI were significant at 5 percent level of significance.

Co-integration Test

Co-integration tests are tests designed to find out the existence or otherwise of a long-term equilibrium relationship between the variables under consideration. (Johansen, 1988; Johansen and Juselius, 1990). The presence of a long-term relationship not only satisfied the convergence property, but is also vital in policy making. Besides, this approached is preferred in this study because of its useful properties particularly that it does not depend upon the method of normalization chosen. The number of lags used is based on the evidence provided by the Akaike Information Criteria (AIC).

The result of the co-integration tests indicates that both the trace statistic and maximum eigenvalue statistic confirm the existence of co-integrating equations among the variables. The co-integrating tests were conducted after allowing for non-linear trends domestic savings (SAV), official development assistance (i.e. foreign aid - ODA), gross domestic product (GDP), real per capita income (RPCI), and gross fixed capital formation (GFCF). Table 3 presents the estimates of Johansen procedure and the associated standard statistics.

Table 3: Co-integration Test Results

Null Hypothesis	Trace-Statistic	Max. eigen-statistic
$r = 0$	171.9592*	116.6116*
$r \leq 1$	55.34763*	26.82412*
$r \leq 2$	28.52351*	17.64083
$r \leq 3$	10.88268	10.55002
$r \leq 4$	0.332653	0.332653

Note: *Significant at 5% level. Both statistics suggest, at least 2 co-integrating equations at 5% level.
Source: Author's Computation

Error-Correction Result

Table 4 contains the results of the estimated dynamic error correction model. The t-values and their corresponding critical values, the standard errors of the estimated parameters are reported in the table.

Table 4: The Parsimonious Error Correction Model
Dependent variable: D (SAV)
Sample (Adjusted): 1984: 2015
Included observations: 32after adjustments

Variable	Coefficient	Std- Error	t-statistic	Prob.
DODA(-3)	237.16***	35.49	6.68	0.00
DRPCI(-2)	22.85	18.11	1.43	0.17
DGDP	0.19***	0.06	3.25	0.01
DGFCF	-0.15	0.21	-0.72	0.48
C	-32315.89	38002.90	-0.85	0.41
ECM(-1)	-0.404**	0.19	2.13	0.05

R-Squared	0.9280; Adjusted R-Squared 0.8786
F-statistic	18.7753 (0.0000)
Akaike info criterion	26.9736
Schwarz criterion	27.5445
Durbin-Watson Stat.	2.0391

Source: Author's Computation. Where *, ** & *** represent 10%, 5% and 1% level of significance for the both t and F statistics

From Table 4, the coefficient of the error correction term is appropriately signed and is statistically significant at 5% with the speed of convergence to long-run equilibrium of 40.4%. In other words, approximately 40.4% of the deviations in the previous year is corrected for in the current year.

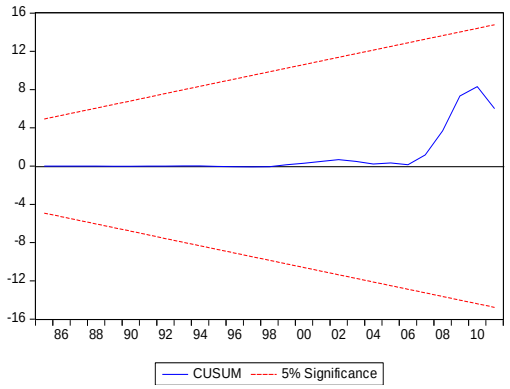
Essentially, foreign aid has a significant positive relationship with domestic savings (that is, foreign aid complements, rather than substitute domestic savings in Nigeria). This finding is in consonance with findings of Over (1975), Bowen (1998) and Waheed (2003). The coefficient of aggregate GDP is positive and highly significant at the 1% level, suggesting that growth in national output raises the propensity for domestic savings, through its positive effects on income. However, growth in per capita income, although positive, was not significant at the conventional test levels, confirming that persons relatively poor and lacking sufficient income and assets would remain trapped in the vicious cycle of poverty. The impact of gross capital formation on national savings is negative and also not statistically significant in the model, reflecting the nature of investments in the country. This finding negates the capital fundamentalists' view that growth in capital formation could be a major driver for rapid sustainable rise in output.

In addition, the diagnostic test shows that the adjusted coefficient of determination (R^{-2}) is 0.8786 percent, implying that the model explains about 88 percent of what happens to the dependent variables (domestic savings). The remaining 12 percent can be ascribed to a litany of other factors not implicitly included in the model. Such factor could include institutional variables, weak fiscal-monetary policy co-ordination and mediocre reforms, amongst others.

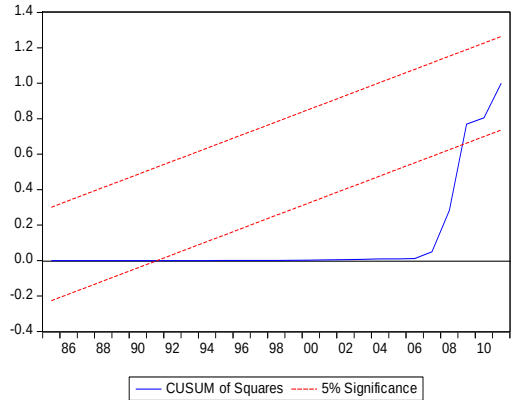
Stability Analysis

Following the procedure provided by Brown, Durbin and Evans (1975), this study investigated the short run stability of the parameters in the domestic savings model using the plots of cumulative sum of the residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMsq). The results of the two tests are provided in figures 1(A) and 1(B) respectively. Essentially, the existence of parameters instability is established if the CUSUM and CUSUMsq go outside the bands represented by the two critical (dotted) lines. From the graphs, only CUSUM stays within the 5 percent critical line, implying parameter stability throughout the sample period of the study. For CUSUMsq, parameter instability established between 1991 and 2009. Thus, the finding is relatively robust for policy analysis and formulation.

1A



1B



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Conclusions and Recommendations

The paper has investigated the nexus between domestic savings and foreign aid using Johansen Co-integration technique and error correction model, employing time series data for the variables; domestic savings, foreign aid, gross domestic product, real per capita income and gross fixed capital formation over the period 1980 to 2015. The most important findings resided in the existence of long-run (positive) and short-run relationships between foreign aid and domestic savings as implied by the statistical significance of the coefficients of foreign aid and the lagged error term (ECM) respectively. In other words, within the Nigeria context, foreign aid tends to complement domestic savings, while the parameter stability test (CUSUM) reveals the stability of the parameters throughout the sample period of the study. From the available evidence, it cannot be reasonably argued that the inflow of foreign aid is the cause of low savings in Nigeria. In other words, the problem of low savings in Nigeria may probably be associated with factors other than the influx of foreign aid into the country.

Accordingly, the specific policy recommendations of the study are as follows: first, since there is a general failure on the part of the government to generate large savings, efforts should be made to widen the tax base, to include the non-oil sectors as these sectors have grown remarkably well in recent years. Domestic savings from such sectors should be channeled into productive investment with a view to raising the rate of economic growth.

Second, the focus of development policy in Nigeria should be to genuinely diversify the productive base of the economy in order to encourage real income growth. In this regard, the on-going vision 20:2020 programme of the government, which is partly saddled with the responsibility of increasing diversification of the economy, should be conscienciously sustained.

Third, since public savings has been shown to complement rather than substitute private savings in Nigeria (Nwachukwu, 2010), the latter can be enhanced by strengthening the relevant domestic policy frameworks aimed at encouraging private savings in the economy. Such measures will, in turn, promote real income growth and reduce unemployment. This can be achieved by encouraging a return to agriculture and promoting small and medium scale enterprises, as well as education.

Fourth, since foreign aid has the potential of boosting domestic savings, investment and economic growth in Nigeria, attracting large quantum of foreign aid should be accorded priority in development policy programmes. Such policy thrust should include accelerating reforms especially in the areas of privatization, real exchange rate devaluation and other relevant macroeconomic reforms, that may directly or indirectly boost the inflow of foreign aid to Nigeria.

Finally, it is pertinent to remark that though this study focused on Nigeria, its results can nevertheless be applied to many other African countries with similar socio-economic structures, but which have not been previously investigated. This is so because it contains some invaluable lessons which could inform policy measures in the current drive by African countries towards mobilizing additional external finance to meet the Sustainable Development Goals (SDG) targets

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