

The Effect of Foreign Aid on Economic Growth in Ghana

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Abstract

This paper analyzes the effect of foreign aid on economic growth in Ghana using time series data from 1972 to 2012. The hypothesis that foreign aid can promote growth in developing countries was explored. The ARDL approach to cointegration (bounds testing) was employed to examine both the long run and short run relationships between aid and economic growth. The results of the bounds test showed that there is cointegration between foreign aid and economic growth in Ghana. This was further confirmed by the error correction term which was very significant and correctly signed. The error correction term showed that the speed of convergence to long run equilibrium is moderate. The results also indicate that all the variables with the exception of the dummy variable were significant in explaining economic growth in both the long run and the short run in Ghana. From the results, labour, capital and government expenditure have positive impact on economic growth in Ghana in both the long run and the short run whereas foreign aid and interest payment on external debt have negative impact on growth. In order to derive a positive benefit of foreign aid, the study recommends the provision of economic aid which is geared towards capital formation and skills development of labour through education and training rather than political aid since the results show that capital and labour have positive impact on economic growth. We also recommend the provision of more grants and less loans as aid to Ghana because interest payment on external debt has been found in the study to have negative effect on economic growth because most foreign aid are not invested in projects with direct future cash flows.

Keywords: Foreign Aid, Economic Growth, Ghana, Cointegration

Introduction

Official development assistance (ODA), usually referred to as foreign aid, entails resource transfers from development partners in the form of grants and loans at concessional terms, to developing countries. The primary objective of much of the aid inflows to developing countries such as Ghana is the promotion of economic development and welfare, usually measured by its impact on economic growth and poverty reduction. To this end, a significant number of empirical studies on the Aid-Economic growth nexus have sort to find out whether aid inflows in developing countries reaches its core objective of promoting economic development and welfare

of the people in these countries. However, results obtained from these studies differ significantly according to the approach used (Moreira, 2005). Studies at the micro-level, mainly using cost-benefit analyses, report that foreign aid is growth-enhancing. In contrast, the results presented in studies at the macro-level, using cross-country regressions are generally ambiguous. This contradiction in the Aid-Economic growth relationship has been termed by Mosley (1986) as the “micro-macro paradox”.

Ghana over the years has been one of the aid community’s preferred destinations for aid-supported projects in Sub-Saharan Africa owing to a myriad of factors. But aid inflows in the country was generally low in the late 1960’s and 1970’s owing to frequent military interventions, chronic domestic economic mismanagement and the default on foreign loans by the Acheampong-led military government in 1972. This among others resulted in a significant decline in economic growth during the period (CEPA, 2005). In the late 1980s and early 1990s, Ghana benefited from a significant amount of aid inflows largely as a consequence of the pursuance of reforms and structural adjustments during the Economic Recovery Program (ERP) of 1983 and the Structural Adjustment Program (SAP) of 1986. Between 1985 and 1996 total aid flows to Ghana increased threefold from US\$150.7 million to US\$450.8 million in 1995. The rapid increase between 1990 and 1991 was linked to the then upcoming multiparty democratic elections and was deemed to have been driven primarily by increased grants to support various institutional-building activities. Ghana’s foreign aid per capita (loans and grants) rose sharply from \$18 in 1980 to a peak of \$38 in 1998 before falling to \$32 in 1999. The sharp rise in aid resources reflects the massive inflow of donor assistance in support of the economic and structural reforms which begun in 1983 (Tsikata, 1999). Ghana’s net aid as a ratio of gross national income of 13% is 9 full points above the sub-Saharan average of 4% (CEPA, 2005)

Aryeetey and Tarp (2000) have argued that the sustained economic growth of the 1980s in Ghana came about as a result of the expansion of capital application, largely as a consequence of increased aid inflows, which was similar to the expansion that occurred in the 1960s financed largely through accumulated reserves from the 1950s. In the late 1990s, the pursuit of democratic governance also endeared Ghana to the aid community. Over the last century, a number of factors reinforced donor’s enthusiasm in Ghana. CEPA (2005) cite the following as some of these factors: the successful transfer of political power from one elected government to the other in 2000, the new government’s commitment to promoting the rule of law and democratic governance, to poverty reduction and growth (at a time when the aid paradigm focused more explicitly on supporting poverty reduction programs), as well as the new government’s enthusiasm for improvements in corporate governance and private sector led-growth.

Paradoxically, throughout the 90s, a string of budget deficits, rising debt and high debt service burden, rapid growth in the money supply, high and volatile inflation, unstable exchange rate and unfavorable terms of trade all combined to hurt the performance of the economy. By its own historical standards, the economy regained some growth impetus beginning in 2001. This was largely on account of relief of the external debt burden, improved export earnings, a focused attention on growth and poverty alleviation, a noticeably improved fiscal and monetary management, and the availability of development assistance. Traditionally, both multilateral and bilateral agencies have supported Ghana’s development efforts through aid pledges. Pledges and disbursements were volatile throughout the 1990s. Disbursements as percentage of total pledges

ranged between 29% and 81% and averaged about 64% during the decade of 1989/1999. This made dependence on development aid more and more precarious. The impact of the shortfalls in aid inflows reflected mainly in domestic borrowing, balance of payment deficits and declines in foreign reserves.

Growth and poverty reduction have not always been the main motives for providing aid. Berthélemy (2006) shows that strategic motives and self-interest by donors to a large extent explain aid allocation. Clemens, Radelet and Bhavnani (2004) divide aid into three categories to discover that the effects on growth differ considerably. Emergency and humanitarian aid has no effect on growth. The same is true for aid aiming at a long term growth effect, such as aid in support of democracy, the environment, education and health. Aid with possible short term growth effects, such as budget support aid and support to productive sectors, are found to have a strong effect on growth. The aid effectiveness literature also discusses two other possible outcomes of aid flows. Rajan and Subramanian (2005) argue that aid flows reduce partner country competitiveness through exchange rate appreciations. This could prove particularly harmful if results by Hausmann, Pritchett and Rodrik (2005) are proven to be correct. The authors studied turning points in growth to discover that growth acceleration tends to correlate with increases in investment and exports, and with real exchange depreciation. From the foregoing, the present study seeks to provide fresh evidence on the aid-growth nexus using time series data on Ghana from 1972 to 2012.

Literature Review

The aid-growth nexus could be tracked back to the work of Keynes who in the 1930's argued that growth can be stimulated by government through increased investment (Erixon, 2005). The Keynesian idea of aid and growth has informed works of several researchers. The Harrold-Domar model has been the theoretical pivot on which earlier models for the determinants of the aid-growth link was based. The ideas of Harrold-Domar growth model informed most growth studies, with Chenery and Strout (1996) developing the Gap theory; the earliest of these aid-growth models. Hansen and Tarp (2001) with critical review on recent developments in the aid and growth studies, divide the various literature into three generations. The first generation category comprised of studies motivated by the Harrod-Domar model, which assume increased savings to result in investment and growth. The second generation studies directly examined this aid-investment-growth link without focusing on savings, whilst the third generation make some addition by increasing the country coverage, accounting for the political environment by using some regressors as a proxy, and also making some strides with the acceptance of non-linearity in the aid-growth nexus.

Studies on aid-growth relationship has however not been able to provide conclusive results. Both cross country studies like Levy (1988), Dhakal et al. (1996), Boone (1996), Nyoni (1998), Dollar and Easterly (1999), Burnside and Dollar (2000), Burke and Almadi-Esfahani (2006), Kosack and Tobin (2006), and Girijasankar (2008); and country specific studies (see Murty et al., 1994; Durbarry et al., 1998; Gounder, 2001) on this relationship have provided mixed results. Some studies find statistically significant correlation between aid and growth and some do not.

There is little evidence of a significant positive impact of aid on long-term growth of poor countries from selected literature. Employing data on a sample of 34 Less Developed Countries

(LDCs) for the period 1955/1965, Papanek (1973) obtained a significantly positive effect of aid on growth. Stoneman (1975) and Gupta (1975) found similar result for a wider data and sample of LDCs. Relatively not many studies revealed that aid is generally effective in promoting growth (Durberry et al., 1998; Hansen and Tarp, 2000). Hadjimichael et al. (1995) found the positive aid-growth nexus to be conditioned upon the estimation technique employed. Lloyd et al. (2001) found aid to impact on long term private consumption but its marginal impact was not as much as that on exports. Dalgaard, Hansen, and Tarp (2004) have shown that aid advances improve steady state productivity in the receiving country via increased capital stock per head. Roodman (2004) also finds the determinants of aid-growth nexus to include governance, domestic policies, historical circumstances and external condition tied to the transfer. An interesting third generation study is that of Burnside and Dollar (2000) who find the effectiveness of aid flows in strengthening economic growth in the developing countries to be conditioned on the conduciveness of the policy environment. The significance of the policy environment in enhancing a positive aid-growth connection is validated by Collier and Dollar (2002) by employing a different data set and model specification. Collier and Hoeffler (2004) also empirically confirmed the effectiveness of aid in a good policy environment.

However some scholars and researchers have criticized the importance of foreign aid in development by using variety of political, economic and strategic rationales in making their case. Boone (1996) referred to aid and its importance to development as 'down the rat hole'. Aid becomes waste when given to countries that do not have the requisite or appropriate technical or administrative ability to absorb and use it appropriately. Aid to most developing countries are usually not used for the intended purposes for which it was advanced. Aid has been argued in several literature not to contribute to economic progress in developing countries. According to Bauer (1991), aid tend to increase the government's political power, resources, and patronage relative to the deprived society as they are generally transferred to governments of those countries. This consequently results in political unrest as much more energy, attention, and resources are drawn into unproductive and non-economic activities. This claim is confirmed by the studies by Dollar and Easterly (1999) who found aid to be ineffective in increasing investments in Africa. Other studies like Burnside and Dollar (1997, 2000); Alesina and Dollar (2000) found aid to be ineffective in promoting growth in the receiving countries, especially in Africa. Similar study by Griffin and Enos (1970) for a sample of 32 Latin American Countries spanning the periods 1957-64 report a growth reducing effect of aid. Using data on 22 LDCs covering the periods 1956 to 1968, Voivodas (1973) also found that aid has a negative impact on growth, albeit insignificant. This could probably be due to the estimation technique employed in the study.

In studying aid-growth nexus, the problem of aid heterogeneity is not uncommon. The main motives of aid advances has not always been growth stimulation and poverty reduction. Aid allocation according to Berthelmy (2006) to a large extent is explained by the strategic motives and self-interest of the donors. In an attempt to examine the impact of aid on growth, Clemens, Radelet and Bhavnani (2004) categorized aid into three: emergency and humanitarian; support of democracy, environment, education and health; and budget support and support for productive sectors. The emergency and humanitarian, as well as aid aimed at a long term growth effect (the support of democracy, environment, education and health) were found to be growth ineffective.

The budget support and support to productive sectors which is aimed at short term growth effects was found to have strong effect on growth.

Methodology

Aid-Growth Equation Specification

Following the works of Feder (1983) and Fosu (1990), we use the Aggregate Production Function (APF) as the underlying model to estimate the Aid-Growth relationship in Ghana. According to the neoclassical growth model, labour and capital inputs are able to explain to a large extent economic growth patterns in a given country. This notwithstanding, other explanatory variables are significant in deriving output changes; such variables have been considered on the basis of theoretical foundations as well as country-specific characteristics (Boakye, 2012).

One important assumption underpinning the APF is that, along with “conventional inputs” of labour and capital used in the neoclassical production function, “non-traditional inputs” like foreign aid and government expenditure among others may be included in the model to capture their contribution to economic growth.

The APF stipulates that the factors of production and the production technology determine the level of output in an economy which can be summarized as:

$$Y_t = A_t LB_t^{\beta_1} CAP_t^{\beta_2} e^{\alpha} \dots\dots\dots(3.1)$$

Y represents the aggregate output of the economy (real GDP per capita) at time t whiles CAP , LB , and A denote the amount of capital stock, labour stock and total factor productivity (TFP) respectively. Assuming constant technology, an increase in the amount of inputs in the model will increase the level of output in the economy. ‘ A ’ denotes total factor productivity (TFP). Thus, A accounts for increases in output not brought about by an increase in inputs. Because this study seeks to establish the impact of aid inflows on economic growth via changes in TFP , we assume therefore that TFP is a function of foreign aid inflows and other factors. Thus, it is assumed that;

$$A = f(AID, GXP, INP, D) = AID^{\beta_3} GXP^{\beta_4} INP^{\beta_5} DUM_t^{\gamma} \dots\dots\dots(3.2)$$

Where; AID is Official development assistance as a ratio of gross domestic product (GDP) at constant prices; GXP is annual government expenditure as a ratio of GDP ; INP is the ratio of interest payments on external debt to Gross National Income and DUM : Dummy (proxy for constitutional regime).

By putting 3.2 into 3.1, we arrive at 3.3 specified below

$$Y = LB_t^{\beta_1} CAP_t^{\beta_2} AID^{\beta_3} GXP^{\beta_4} INP^{\beta_5} DUM_t^{\gamma} e^{\alpha} \dots\dots\dots(3.3)$$

From 3.3, we take natural logs of both sides of the equation to obtain the operational model for real GDP per capita for Ghana in an econometric form as:

$$\ln Y_t = \beta_0 + \beta_1 \ln LB_t + \beta_2 \ln CAP_t + \beta_3 \ln AID_t + \beta_4 \ln GXP_t + \beta_5 \ln INP_t + \gamma DUM_t + \varepsilon_t \dots (3.4)$$

All variables in the model with the exception of ε_t (white noise error term) are as previously defined. t , is time and \ln denotes natural logarithm. 3.4 shows the long-run equilibrium (cointegration) relationship between growth in real GDP per capita and foreign aid.

Labour input (LB), measured in this model as the labour force participation rate is expected to lead to an increase in real GDP per capita. Thus, holding all other factors constant, an increase in the labour force participation rate is expected to lead to increase in real GDP per capita. Hence, the coefficient of labour is expected to be positive ($\beta_1 > 0$)

Capital input (CAP) measured as gross fixed capital formation is theoretically expected to have a positive impact on real GDP per capita. Thus, an increase in capital formation results in growth of real GDP per capita, holding all other factors constant. As a result, the coefficient of capital is expected to be positive ($\beta_2 > 0$)

The main variable of interest in the study (AID), herein considered as official development assistance as a ratio of real GDP is theoretically expected to augment domestic capital formation and hence enhance economic growth. An increase in the inflow of AID is expected to lead to an increase in the rate of growth. Thus, coefficient of AID is expected to be positive ($\beta_3 > 0$). The focus of the present study is to test the statistical significance of AID on economic growth.

Government expenditure (GXP) is expected to stimulate economic growth by increasing aggregate demand particularly in periods of recession or in a case of high unemployment like the situation in Ghana. Increase in government expenditure is therefore growth enhancing ($\beta_4 > 0$)

Interest payment on external debt is expected to have adverse effect on economic growth. It can increase the budget deficit of a country and also reduce public savings especially when the amount is huge. It can also result in currency depreciation. It is therefore expected that interest payments on external debt will be negatively related to economic growth ($\beta_5 < 0$).

In theory, it is asserted that a regime of constitutional rule ensures well-functioning democratic institutions and promotes checks and balances, which is a necessary condition for a favourable investment climate and hence economic growth. According to Stasavage (2002) military interventions (coup d'états) are likely to lead to political instability and economic mismanagement. Thus, a constitutional regime in which property rights and contracts are enforced through a properly functioning judicial system will have a positive impact on economic growth (Boakye, 2012). Thus, the dummy variable in the model (DUM) is expected to positively influence growth ($\gamma > 0$).

β_0 is the intercept of the regression equation.

In order to empirically examine the relationship between aid and economic growth, the bound testing cointegration approach developed by Pesaran and Pesaran (1997) is employed. **This approach is chosen for two main reasons.** First, with infinite sample data as is the case in this study, this technique produces relatively more efficient results. Moreover, endogeneity problem is fixed in this technique provided an appropriate lag length is used (Pesaran & Shin, 1999). However, one weakness of this technique is that the procedure crashes in the presence of I(2) series.

The ARDL model is written as

$$\begin{aligned} \Delta \ln Y_t = & b_0 + \delta \ln Y_{t-1} + \beta_1 \ln LB_{t-1} + \beta_2 \ln CAP_{t-1} + \beta_3 \ln AID_{t-1} + \beta_4 \ln GXP_{t-1} + \beta_5 \ln INP_{t-1} + \\ & \sum_{i=1}^q \phi_1 \Delta \ln Y_{t-i} + \sum_{i=0}^q \phi_2 \Delta \ln LB_{t-i} + \sum_{i=0}^q \phi_3 \Delta \ln CAP_{t-i} + \sum_{i=0}^q \phi_4 \Delta \ln AID_{t-i} + \sum_{i=0}^q \phi_5 \Delta \ln GXP_{t-i} + \\ & \sum_{i=0}^q \phi_6 \Delta \ln INP_{t-i} + \gamma DUM_t + \varepsilon_t \dots \dots \dots 3.5 \end{aligned}$$

Where b_0 is the constant, δ and β_i are the long run elasticities, ϕ_i are the short run elasticities and the white noise errors are ε_t in the ARDL model above.

To conduct the bound test, the first step is to estimate equation (3.5) using the OLS and then conduct the F-test to check for long run relationship among the variables. The null hypothesis of the F-test of no joint significance of the coefficients of the lagged variables: $\delta = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ is tested against the alternative hypothesis of joint significance $\delta \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$. The magnitude of the F-statistic will determine whether there exist cointegration among the variables or not. In conducting the bounds test, if the independent variables are I(d) (where $0 \leq d \leq 1$), then the two critical value bounds provided by Pesaran and Pesaran (1997) provide a test for cointegration. Here, if the F-statistic falls within the critical bounds, the test is inconclusive. If the F-statistic is higher than the upper bound the null hypothesis of no cointegration is rejected. However, if the F-statistic is below the lower bound we fail to reject the null hypothesis.

After cointegration is found to exist among the variables, the next step is to estimate the long run coefficients of the ARDL(q,r,s,t,u,v). The specification for the long run is as follows.

$$\begin{aligned} \ln Y = & b_c + \sum_{i=1}^q \delta_1 \ln Y_{t-i} + \sum_{i=0}^r \beta_6 \ln LB_{t-i} + \sum_{i=0}^s \beta_7 \ln CAP_{t-i} + \sum_{i=0}^t \beta_8 \ln AID_{t-i} + \sum_{i=0}^u \beta_9 \ln GXP_{t-i} + \\ & \sum_{i=0}^v \beta_{10} \ln INP_{t-i} + \gamma_1 DUM_t + u_t \dots \dots \dots 3.6 \end{aligned}$$

Where b_c is the constant, δ_1 and β_i are the long run elasticities, and the white noise errors are u_t in equation 3.6.

Finally, an error correction model as shown in equation 3.7 is estimated to obtain the short run parameters.

$$\Delta \ln Y_t = \alpha + \sum_{i=1}^q \phi_7 \Delta \ln Y_{t-i} + \sum_{i=0}^r \phi_8 \Delta \ln LB_{t-i} + \sum_{i=0}^s \phi_9 \Delta \ln CAP_{t-i} + \sum_{i=0}^t \phi_{10} \Delta \ln AID_{t-i} + \sum_{i=0}^u \phi_{11} \Delta \ln GXP_{t-i} + \sum_{i=0}^v \phi_{12} \Delta \ln INP_{t-i} + \gamma_2 DUM_t + \varpi ECT_{t-1} + v_t \dots \dots \dots 3.7$$

Where α is the constant and ϕ_i are the short run elasticities, ϖ is the coefficient of the error correction term and the white noise errors are v_t in equation 3.7.

Results and Discussion

Unit Root Tests

The ARDL approach to cointegration does not require pre-testing of the variables for unit root. However, according to Ahmed, Muzib and Roy (2013) the bound test will make no sense if some of the variables are integrated of order 2 since the computed F-statistics provided by Pesaran and Pesaran (2001) will no longer hold in the presence of I(2) variables. The study therefore conducted unit root test using the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests to ensure that none of the variables are I(2). Table 1 displays the result of the unit root test. From Table 1 it can be seen that all the variables are I(1).

Table 1: Unit Root Test

VARIABLE	ADF test	(with intercept)		PP test	(with intercept)	
	LEVELS	1 st DIFFERENCE	I(d)	LEVELS	1 st DIFFERENCE	I(d)
LY	0.4794	-3.8792***	I(1)	0.9458	-3.8232***	I(1)
LLB	-2.2032	-4.4989***	I(1)	2.2446	-4.1291***	I(1)
LCAP	-0.7668	-7.3099***	I(1)	-0.8423	-7.3099***	I(1)
LAID	-2.2351	-10.872***	I(1)	-2.0345	-12.292***	I(1)
LGXP	-2.1344	-5.0920***	I(1)	-1.8011	-4.9699***	I(1)
LINP	-2.0111	-6.9411***	I(1)	-1.9860	-6.9411***	I(1)

Note: D denotes first difference, *** represents significance at 1% level and L represents log
Source: computed from WDI(2015).

Bounds Test for Cointegration

The study estimated equation (3.5) to test for cointegration among the variables. A maximum lag order of 2 was chosen due to the use of annual frequency over a short time span. A general-to-specific modelling approach was employed. Table 2 reports the result of the bounds test with real GDP per capita as the dependent variable. The F-statistic from Table 2 of $F_Y(Y|AID,CAP, LB, GXP, INP) = 13.3442$ is greater than the upper bound at 1 percent significance level. This implies that the null hypothesis of no cointegration is rejected, and thus suggesting the existence of long run relationship among the variables.

Table 2: Bound Testing

Dependent Variable	F-statistic	
$F_Y (Y LB, CAP, AID, GXP, INP)$	13.3442	
Pesaran and Pesaran (1997)	(Intercept with no trend)	K= 6
Critical Value	Lower Bound	Upper Bound
1%	3.627	4.540
5%	2.476	3.646
10%	2.141	3.250

After finding cointegration among the variables, the next step was to estimate the long run coefficients from equation 3.6. Table 3 reports the results of the long run parameters.

Long run Coefficients

Table 3: Estimated Long Run Coefficients using the ARDL Approach

ARDL(2,0,0,0,0) selected based on Schwarz Bayesian Criterion				
Dependent Variable is LY				
Regressor	Coefficient	Standard Error	T-Ratio	Probability
LLB	4.0161	0.6753	5.9473	0.0000
LCAP	0.0047	0.0024	1.9332	0.0630
LAID	-0.0742	0.0350	-2.1202	0.0420
LGXP	0.1526	0.0650	2.3478	0.0260
LINP	-0.1566	0.0302	-5.1836	0.0000
DUM	0.0255	0.0295	0.8620	0.3960
C	8.3651	0.4825	17.3376	0.0000

From Table 3, the following deductions can be made: The estimated coefficient of aid is -0.0742 and significant at 5 percent level. This implies that a 1 percent increase in foreign aid will cause real GDP per capita to decline by about 0.07 percent. The negative aid-growth relationship conflicts with the apriori sign of the study (which is positive) and the findings of some empirical studies that reported a positive aid-growth relationship (see Papanek, 1973; Aryeetey & Tarp, 2000; Dalgaard et al. 2004 and Karras, 2006). This finding is however consistent with Ekanayake et al. (2008) who reported that foreign aid has a negative effect on economic growth for low-middle income countries such as Ghana. Brautigam and Knack (2004) also find evidence for negative impact of foreign aid on economic growth in developing countries. Osew (2012) assert that the negative effect of aid on growth could be attributed to the following reasons: (1) The fact that foreign aid may not be used for the intended purpose and may give rise to engagement in corrupt activities such as using foreign aid to sponsor political campaigns leading to the perpetuation of bad governments. (2) The embezzlement or use of foreign aid (which come in the form of loans) to enrich some few political elites poses a great economic burden on receiving countries as repayment of principal and interests harm the growth of the

economy. (3) Lack of integration of aid-supported programs into the national development framework. Labour force, government expenditure and capital have positive effects on GDP per capita as expected at 1 percent, 5 percent and 10 percent significance levels respectively. Interest payment on external debt also has the expected negative sign and very significant at 1 percent level while the dummy variable for democracy is not significant.

Short run relationship

Once the long run coefficients were estimated, we proceeded to conduct the short run estimate. The results from Table 4 show that the error correction term (ECT) of -0.4460 is significant at 1 percent confirming the existence of cointegration among the variables. The absolute value of the ECT is less than 1 and also negative as expected. The value of the ECT implies that about 45 percent of the deviations from equilibrium caused by shocks in the previous year converges back to equilibrium in the current year. Thus, there exist a moderate speed of adjustment to equilibrium.

From Table 4 a negative relationship is also found between foreign aid and real per capita GDP at 5 percent significance level. Specifically, a 100 percent increase in foreign aid will lead to approximately 3 percent decline in per capita GDP in the short run. The signs of the rest of the short run coefficients are consistent with the long run coefficients and the significance levels are also maintained. The previous year's real per capita GDP is also found to have a positive impact on the current GDP per capita in the short run. The dummy variable is also not significant in the short run.

Table 4: Error Correction Representation for the Selected ARDL Model

ARDL(2,0,0,0,0) selected based on Schwarz Bayesian Criterion

Dependent variable is DLY

Regressor	Coefficient	Standard Error	T-Ratio	Probability
ECT(-1)	-0.4460	0.07846	-5.6843	0.0000
DLY(-1)	0.2430	0.1402	1.7339	0.0930
DLLB	1.7912	0.3293	5.4390	0.0000
DLCAP	0.0021	0.0011	1.9509	0.0600
DLAID	-0.0331	0.0162	-2.0421	0.0500
DLGXP	0.0681	0.0290	2.3460	0.0260
DLINP	-0.0698	0.0179	-3.9033	0.0000
DUM	0.0114	0.0136	0.8366	0.4090
C	3.7308	0.6037	6.1801	0.0000

R-Squared 0.70509 R-Bar-Squared 0.62645 F-stat. F(8, 30) 8.9658[0.000]

DW-statistic 2.2399

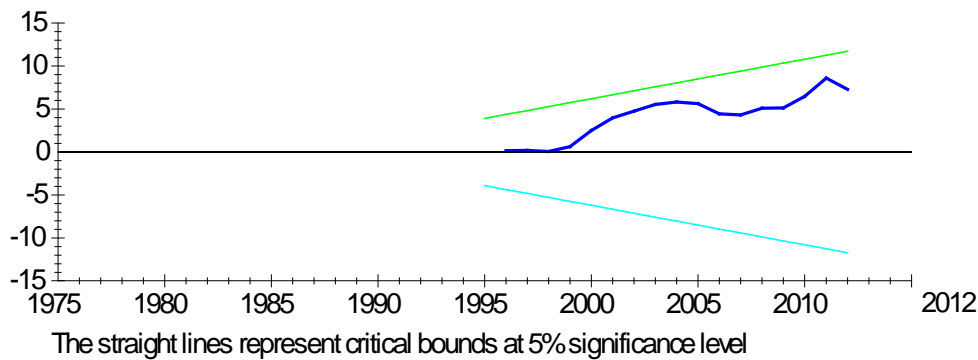
Diagnostic Tests

The R-Squared value of 92% and the R-Bar-Squared value of 84% of the ARDL model in equation 3.5 show a good fit model. The results from Table 5 show that the model passed all the post estimation tests conducted in the study. The model does not suffer from serial correlation, mis-specification, heteroscedasticity or non-normality of residuals. It also passed the CUSUM and CUSUMSQ of recursive residuals tests which imply the estimated coefficients are stable.

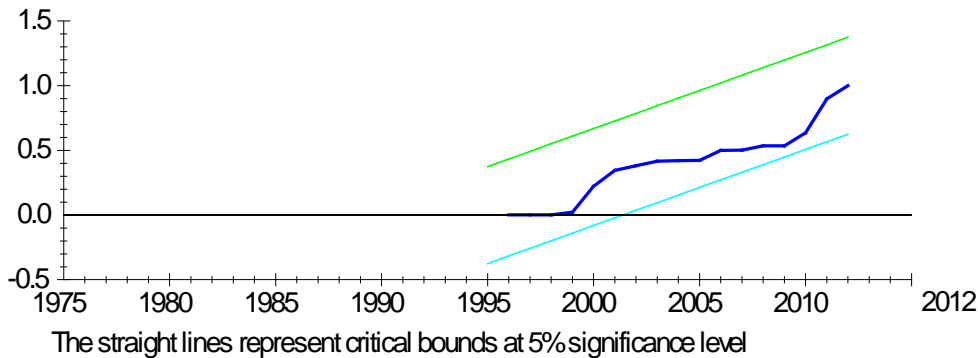
Table 5: Diagnostic Tests

Test Statistics	LM Version	F Version
Serial Correlation	$\chi^2(1) = 1.7115[0.191]$	F(1,17)= 0.80177[0.383]
Functional Form	$\chi^2(1) = 1.5122[0.219]$	F(1,17)= 0.70456[0.413]
Normality	$\chi^2(2) = 0.97513[0.614]$	Not applicable
Heteroscedasticity	$\chi^2(1) = 0.15484[0.694]$	F(1,36)= 0.14729[0.703]

Plot of Cumulative Sum of Recursive Residuals



Plot of Cumulative Sum of Squares of Recursive Residuals



Conclusion

In this study, the ARDL approach to cointegration (bounds testing) was employed to examine both the long run and short run relationships between aid and economic growth. The result of the bounds test showed the existence of a long run relationship between the variables. This was further confirmed by the error correction term which was very significant and correctly signed. The study found the speed of convergence to long run equilibrium to be moderate. The results also indicate that all the variables with the exception of the dummy variable were significant in explaining economic growth in both the long run and the short run in Ghana.

From the results, labour, capital and government expenditure have positive impact on economic growth in Ghana in both the long run and the short run while aid and interest payment on external debt have negative impact on growth. This implies that aid which is intended to promote economic development end up harming the economy of Ghana due to mainly corruption and high interest payments on aids that come in the form of loans. In order to derive the full benefit of foreign aid, the study recommends the provision of economic aid which is geared towards capital formation and skills development of labour through education and training rather than political aid since the results of the study show that capital and labour have positive impact on growth. The study also recommends the provision of more grants and less loans because interest payment on external debt has been found in the study to have negative effect on economic growth since most foreign aid are not profitably invested in Ghana.

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