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The Impact of Foreign Aid on Economic Growth of Ethiopia

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Abstract
The study has examined the impact of foreign aid on economic growth in Ethiopia over the period 1974 to 2013 using multivariate co integration analysis. The empirical result from the growth model shows that aid has a significant positive impact on growth in the long run. The aid-policy interaction term also has a significant positive effect on growth implying that the effectiveness of aid would have been higher if it was supported by a sound macroeconomic policy environment. This study indicated also that the country has no problem of capacity constraint as to the flow of foreign aid.

1. INTRODUCTION

Ethiopia is the second largest populous country in Africa, with an estimated population of nearly 79 million (in 2007) and a growth rate of 2.6 percent per year. Ethiopia is a predominantly rural and young society with 84% living mainly in densely populated highland settlements. It is also one of the poorest countries in the world (with 38.7% of the population being below the poverty line in the year 2004). The Ethiopian economy is a subsistence one that is highly dependent on agriculture, which in turn depends on vagaries of nature. Over 85 percent of the population depends on this sector for earning the means of its livelihood. Agriculture accounts for almost half of the GDP and more than 90 percent of the export earnings. However, the share of agriculture is declining steadily whereas the share of the service sector in GDP is rising recently. On the other hand, the share of the manufacturing sector is relatively static which is between 13 and 14 percent only (MoFED, 2010).

Despite the fact that the history of the growth performance was poor in the past; the country has experienced strong economic growth in the current time (especially, since 2003/04). According to Ncube, Lufumpa and Ndikumana (2010) real GDP averaged 11.2 % per annum during the 2003/04 and 2008/09 period, placing Ethiopia among the top performing economies in sub Saharan Africa. This growth performance is well in excess of the population growth rate and the 7 percent rate required for attaining the MDG goal of halving poverty by 2015. However, there are a number of challenges to sustain the current trend of economic growth. The high dependency of economic growth on timely and adequate rainfall and the country's vulnerability to terms of trade and similar external shocks are structural constraints facing the economy.

The amount of foreign financial assistance that is given to the developing countries in general and for African countries in particular has been increasing from time to time. In Africa, the share of Official Development Assistance (ODA) to GDP has significantly increased over the years. It drastically increased from 1.9 percent in 1960-61 periods to 2.9 percent in 1970-71 and to 5 percent in 1983-84 and reached 9.6 percent in 1990-91 periods (WB 1992). And also, the share of foreign aid to GDP has also increased to 18 percent during 2000-2010 fiscal years.

In Ethiopia, the high import intensity of the economy, limited capacity to produce capital goods, low levels of domestic savings and limited capacity to generate foreign exchange make the development effort in Ethiopian beyond domestic capacity. All these factors have provided an apparently objective justification for the huge inflow of foreign aid.

Despite such increase flow of external finance to the African countries a number of empirical studies argue that the role of aid in promoting the development potential of Africa remained unsuccessful. For instance, between 1970 and 1997, the real per capital GDP of Sub Sahara Africa has been 0.6%, despite huge flow of aid to the region (Gomanee et al, 2002). World Bank (1998), Burnside and Dollar (1997) have raised does aid work? The question raised has been answered. It can work, depending on policies. If they are good, aid will be efficient, if they are not, aid will be useless, at best. Aid has to be allocated to those countries pursuing good policies, to a larger extent, it is argued, than is already the case. Aid effectiveness and aid selectivity issues are thus simultaneously solved.

The literature on the impact of aid on economic growth are mainly in the cross sectional analysis of developing countries. Most of these cross sectional analysis suggest that the growth impacts of foreign assistance vary among countries that pointed out the need for empirical study for individual countries. Particularly, in Ethiopian case, the number of studies conducted so far is limited in number and scope, in which further study is required.

Thus, this paper will attempt to examine the growth impacts of official development assistance by using a multivariate co integration analysis. In broad spectrum, the objective of this paper is to assess the effectiveness of foreign aid in enhancing economic growth.

Specifically this paper tries to:

1. Determine whether there is absorptive capacity constraint of the economy as to the flow of foreign aid or not.
2. Determine whether foreign aid effectiveness is policy dependent or not.

2. DATA AND METHODOLOGY

2.1. Data Type and Source

For the purpose of analyzing the impact of foreign aid on the economic growth through its transmission channels, time serious data, from 1974/75 to 2013/14, would be used. For this achievement secondary data is collected from different government ministers and authorities' data base as well as international financial organizations. These include Minister of Finance and Economic Development, publications of National Bank of Ethiopia (NBE), Ethiopian Investment Authority, Central Statistical Authority (CSA), Ethiopian Economic Association (EEA), International Monetary Fund and World Bank data base.

2.2 Model Specification

This paper would try to assess the impact of aid on growth by using multivariate co integrated VAR approach and it will be examined by specifying the following equation based on the equation that is derived by Gomanee et al (2002).

The growth model, which is used in this study, is based on Harrod –Domar (1946) growth model in which the growth of a given country depends on the amount of investment.

$g = \kappa/Q.I = \delta I$ ……………………….... (1)

Where δ = incremental capital output ratio,
I = investment level,
Q = output level, and
g = growth rate of output.

However, recently different scholars come to include various variables that are believed to affect the growth of a country. Rana and dowling (1988) extended the Harrod Domar growth work by including variables like labor force and policy variables.

Since the objective of this paper is to assess the impact of aid on growth, attempts are made to include variables to further improve the above model and to be in line with the objective.

Thus, the growth function is given by:

$RGDP = f\,(INVo, AID, PA, HC, LAB, (A)^2)$ …........... .... (2)

Where, RGDP = Real Gross domestic product
INVo = investment level that is not financed by aid
AID = aid as a ratio of GDP
PA = aid policy interaction term
HC = human capital proxied by education expenditure
LAB = labor force as a ratio of total population

Accordingly, the model to be estimated can be specified as follows:

$ln RGDP = \beta_0 + \beta_1 INVo + \beta_2 ln AID + \beta_3 PA + \beta_4 HC + \beta_5 ln LAB + \beta_6 A2 + \varepsilon_i$..............(3)

Dependent Variable

Real GDP: The dependent variable of the model is Real GDP

Explanatory Variables

Beside foreign aid a number of factors are expected to influence the economic growth. These variables are briefly described with their respective expected relation to the economic growth.

Non-aid Financed Investment (INVO): This is the ratio of non-aid financed investment to GDP. The variable INVO would be developed by using the technique of generated regressor of Gomannee, Girma, and Morrissey (2005). Using residuals from an aid-investment bi-variate regression i.e. aid is used as the only explanatory variable; a variable is constructed representing that part of investment which is not financed by foreign aid (INVO). Then INVO is used in place of investment in the growth regression. It is worth noting that this transformation affects only the estimated coefficient on the aid variables. Empirical aid-growth regressions usually omit investment from their equation. Aid is intended to affect growth via its effect on investment. However, not all aid is intended for investment, and not all investment is financed by aid. If investment is omitted from the growth equation, there will be potential omitted variable bias—any effect of investment on growth is attributed to the other variables (especially aid) as argued by Girma, Gomannee and Morrissey (2005).

If both aid and investment are included, there will be a problem of double counting (as part of aid is used for investment), and the coefficients are biased. Therefore, to address such problems Gomannee, Girma, and Morrissey (2005) propose the technique of generated regressors (the mechanism of residual generated regressor). Using the technique, non-aid financed investment (INVO) is generated as:

INVO = I-0.04AID

Where, INVO = investment which is not financed by aid.

I = Total investment as ratio of GDP

AID = Official Development Assistance as ratio of GDP

Official Development Assistance (ODA): It is the ratio of Official Development Assistance (ODA) to GDP as defined by the DAC (Development Assistant Committee).

ODA is defined as pure grants and concessional flows from bilateral governments and their agencies as well as multilateral financing agencies to the developing countries at low rates of interest with maturity periods of a long-term nature, all of them containing a grant element of at least 25 %.

A^2: the square of ODA to GDP. This takes into account whether there is diminishing return to aid. The diminishing returns to aid hypothesis assume that an inflow of aid, above a certain threshold level, starts to have negative effects. This happens because of the limited absorptive capacity of recipient countries.

Aid Policy Interaction Term (PA): an interaction between policy indicator (P) and aid (A) which capture the conditional effectiveness of aid on policy. The policy indicator will be developed based on Burnside and Dollar (1997), with minor modifications, out of a regression result obtained from a growth equation. The growth model is comprised of budget surplus/deficit, openness to trade, inflation, and telephone lines per 1000 people (covering aspects of fiscal, trade, monetary, and infrastructure policy) as an explanatory variable, and the coefficients of these variables are taken from the growth regression to construct the policy indicator. To account for openness to trade in the construction of the policy indicator (OPEN), a standard openness index, (X + M)/GDP this is the ratio of total trade to GDP which is exports plus imports divided by GDP (Yanika, 2003) will be used.

The result of the policy indicator obtained is:

Pt= – 2.9635(BD)t +0.1498(OPEN)t +0.1288(INF)t +2.423(TELE)t

Where, BS/BD: overall budget surplus/deficit excluding grants; like Burnside-Dollar (1997) approach this paper will also use inflation as a proxy for monetary policy), OPEN; a standard openness index, (X + M)/GDP (i.e the ratio of total trade to GDP) where X: total value of goods and services exported; M: total value of goods and services imported; TELE: major telephone lines per 1000 people.

Labor Force (LAB): This represents labor force as a ratio of total population. That is age from 15-64 years as a percentage of total population;

Human Capital (HC): A wide range of growth models has treated human capital as a critical factor in determining growth rate of output (Lucas, 1988). It is an important source of long-term growth, either because it is a direct input to research (Romer, 1990) or because of its positive externalities (Lucas, 1988). Policies that enhance public and private investment in human capital, therefore, promote long-run economic growth. The inclusion of human capital variables in growth models are intended to capture quality differences in the labor force, as non-physical capital investment increases the productivity of the existing labor force. They commonly relate to education and are measured by an index of educational attainment, by mean years of schooling, or by school enrolment (Barro and Lee, 1993). However, none of this data are found in the required level so we will use expenditure on education as a proxy to human capital.

2.3. The Unit Root Test

The standard classical methods of estimation which are used in the applied econometric work are based on a set of assumption one of these is that all variables are stationary. However, most economic variables are not stationary (Gujarati, 1995). A data series is said to be stationary if its error term has zero mean, constant variance and the covariance between any two – time periods depends only on the distance or lag between the two periods and not on the actual time which it is computed (Harris, 1995). On the other hand a time series is stationary if its mean, variance and auto covariance (at various lags) remain the same on matter at what point we measure them, i.e they are time invariant (Gujrati, 2004).

There are several ways of testing the presence of unit root. The most common and popular one is the DF test either its simplicity or its more general nature (Harris, 1995)

2.4 Co integration Test

Most macroeconomic variables are found to be non stationary and showing trending overtime (Johansen, 1991). However, one can difference or de trend the variables in order to make the variables stationary. If variables become stationary through differencing, they are in the class of difference stationary process. On the other hand, if they are de trended, they are trend stationary.

Cointegration among the non stationary variables reflects the presence of long run relationship in the system, (Gujarati, 1995). There are two approaches used in testing for Cointegratio. They are: (i) the Engle-Granger (two step algorism) and: (ii) the Johansen Approach

The Engle-Granger (E-G) method requires that for co-integration to exist, all the variables must be integrated of the same order. Hence, once the variables are found to have the same order of integration, the next step is testing for level of integration. This needs to generate the residual from the estimated static equation and test its stationarity.

Although, the Engle-Granger (EG) procedure is easily implemented, it is subject to several limitations.

The Johansen (1988) procedure enables estimating and testing for the presence of multiple co integration relationships, in a single step procedure. Moreover, it permits to estimate the model without priory restricting the variables as endogenous and exogenous. Under this procedure, the variables of the model are represented by a vector of potentially endogenous variables. Therefore, this paper will use the Johansen maximum Likelihood Procedure since it addresses the weakness of the E-G method.

2.5 Vector Error Correction Model (VECM)

Economic variables have short run behavior that can be captured through dynamic modeling. If there is long run relationship among the variables, an error correction model can be formulated that portray both the dynamic and long run interaction between the variables. In the previous discussion, it was shown that if two variables that are non-stationary in levels have a stationary linear combination then the two variables are co integrated. Co integration means the presence of error correcting representation. That is, any deviation from the equilibrium point will revert back to its long run path. Therefore, an ECM depicts both the short run and long run behavior of a system.

2.6. VAR Diagnostic Tests

Once the VAR models are estimated we should make some diagnostic tests which are important in order to make sure that the results obtained from VAR estimation can be used for forecasting or policy purposes. These post-estimation tests are mostly performed on the residual of the VAR and they include: the LM test for residual autocorrelation, Jarque-Bera test for residual multivariate normality, test for VAR stability and White test for the presence of heteroscedasticity in the VAR's residuals.

Residual Vector Normality Test

The Jarque-Bera normality test is used to determine whether the regression errors are normally distributed. It is a joint asymptotic test whose statistic is calculated from the skewness and kurtosis of the residuals.

Error Vector Autocorrelation Test

Testing for autocorrelation helps to identify any relationships that may exist between the current values of the regression residuals and any of its lagged values (Brooks, 2002). The null hypothesis of the LM test for autocorrelation is that the residuals are not serially correlated, while the alternative is that the residuals are serially correlated. If the P-value is less than 0.05 then we reject the null hypothesis (Harris, 1995). The test statistic is given by:

$LM = (T- q)R\,\hat{e}^2$……………………………. (4.25)

Where, q is the degree of freedom and $R\,\hat{e}^{2}$ is the coefficient of determination obtained from the auxiliary regression; and the LM test statistic is chi-square distributed.

Stability Test

The test for stability checks whether the roots of the characteristic polynomial lies inside the unit circle. If all roots lie inside the unit circle then the VAR is considered as stable and can be used for policy analysis. We can also make use of variance decomposition and impulse response functions in our analysis if the VAR is stable.

Heteroscedasticity Test

The test for heteroscedasticity investigates whether the variance of the errors in the model are constant or not. Breusch-Pagan-Godfrey test is used to check whether the residuals are homoskedastic. It tests the null hypothesis that the residuals are both homoskedastic and that there is no problem of misspecification. The test regression is run by regressing each cross product of the residuals on the cross products of the regressors and testing the joint significance of the regression. If the test statistic is significant, that is, P value is less than 0.05; the null hypothesis of homoscedasticity and no misspecification will be rejected (Brooks, 2002: 445).

3.1 Results and Discussion

3.1.1 Unit Root Test Results

Since unit root tests are sensitive to the presence of deterministic regressors, three models are estimated. The most general model restrictive models i.e. with a constant is estimated first and with a drift and time trend and without either constant and trend, respectively, are estimated. A unit root test for each variable is performed on both levels and first differences. The result of the unit root test for the variables at level was presented in table below.

Table 3.1 Unit root test results for variables at level

Variables		With drift only	With drift and trend	Only stochastic
LnRGDP		*-2.724*	*-0.902*	*-2.425*
LnAID		*-0.607*	*-1.309*	*0.956*
PA		*1.846*	*1.338*	*2.037*
HC		*2.254*	*3.474*	*1.625*
LnLAB		*-0.855*	*3.382*	*-0.669*
A^2		*-0.878*	*-1.347*	*-0.725*
$lnINV_o$		*-2.197*	*-2.832*	*-1.201*
Critical values	*1%*	*-3.615588*	*-4.219126*	*-2.627238*
	5%	*-2.941145*	*-3.533083*	*-1.949248*

Source; Eveiws 6 stastical output of ADF test at level.

The ADF test results show that all the variables (at levels) are non stationary with the three different specifications. That is, the test conducted fails to reject the null hypothesis of unit root in the three different specifications.

Therefore, to avoid spurious regression all these variables have to be differenced to transform them to stationarity. In the second stage, the order of integration of the non-stationary variables were performed proceeding in the same way by means of ADF tests applied to all series in first differenced form.

First difference of the each variable was generated by deducting one period lag from the variable of itself of successive period. After making the first difference of each series the usual unit root test of ADF were applied to determine their order of integration. The result of the test was presented below.

Table 3.2 Unit root test results for variables (at 1st difference)

Variables		With drift only	With drift and trend	Only stochastic
DlnRGDP		*-5.348****	*-6.273****	*-4.819****
DLnAID		*-6.431****	*-6.754****	*-6.265****
DPA		*-4.111****	*-4.544****	*-4.001****
DHC		*-3.860****	*-3.832***	*-2.505***
DlnLAB		*5.794****	*4.243****	*4.245****
DA^2		*-6.788****	*-7.185****	*-6.715****
DlnGCEXP		*-4.641****	*-4.707****	*-4.668****
$DINV_o$		*-10.309****	*-10.245****	*-10.416****
Critical values	*1%*	*-3.621023*	*-4.226815*	*-2.628961*
	5%	*-2.943427*	*-3.536601*	*-1.950117*

Source; Eveiws 6 stastical output of ADF test at 1st difference.

*Note ***, ** denotes significant at 1%, 5% significance level respectively.*

The first differences of the variables are investigated for a unit root test and the test result proved that all of them are stationary in the three different specifications. Therefore, it can be conclude that all variables are integrated of order one.

3.1.2. Multivariate Co integration Test Results and VECM

A. Long run Equation for Growth Equation

Once the ADF unit root test result revealed that the series is I (1), a co integration test is performed to determine the rank of the co integrating vector. The rank of the co integrating vector is determined using the Johansen's maximum likelihood method.

Table 3.3 Johansen's Co integration test results

Ho (null hyp.)	Ha(alternative hyp.)	Eingen Value	trace Stat	5% critical value	Prob.	max.	5% critical value	P.value
r = 0	r =1	0.822051	158.0928	125.6154	0.0001	63.87150	46.23142	0.0003
r ≤ 1	r =2	0.622206	94.22126	95.75366	0.0635	36.01601	40.07757	0.1337
r ≤ 2	r=3	0.576493	58.20525	69.81889	0.2946	31.78986	33.877687	0.0869
r ≤ 3	r=4	0.263501	26.41540	47.85613	0.8754	11.31634	27.58434	0.9567
r≤ 4	r=5	0.190987	15.09905	29.79707	0.7736	7.841785	21.13162	0.9131
r ≤ 5	r=6	0.141001	7.257268	15.49471	0.5479	5.623531	14.26460	0.6619
r ≤ 6	r=7	0.043194	1.633737	3.841466	0.2012	1.633737	3.841466	0.2012

Source; Eveiws 6 stastical output of johansen Co integration test.

The optimal lag length used to test for co integration is determined at lag length of one using Akakie Information Criteria (AIC).

The test result (both trace and max statistics) rejects the null hypothesis of no co integration both at the 5 % and 1 % significance level. In other words, the null of at most one co integrating vector is not rejected. Hence, there exists single co integrating vectors which make up the long run relationship among the variables in the system.

The presence of a single co integrating vector points to estimate the long run equation along with its associated coefficients (β) and adjustment parameters (α) which are important for further analysis. The corresponding β and α coefficient vector are reported below.

Table 3.4 Normalized Long run β Coefficients

Variables	LnRGDP	LnAID	PA	A^2	INVo	HC	LnLAB
Estimated coefficients	1.00000	-0.027	-2.24e-06	0.00295	-0.014	-1.10e-10	-5.733

Source; Eveiws 6 stastical output of johansen Co integration test.

Table 3.5 Adjustment (α) coefficients

Variables	LnRGDP	LnAID	PA	A^2	INVo	HC	LnLAB
Adjustment coefficients	-0.725075	-5.135677	-3.61e+08	-45451257	3.522394	-2.48e+09	-8.19e-05

Source; Eveiws 6 stastical output of johansen Co integration test.

Once after conducting co integration tests the next task would be identification of a given equation with specified endogenous and exogenous variables which is the main problem in most econometrics analysis. Therefore to identify variables that are endogenously determined and conditional up on the other variables in the VAR, the test for weak exogeneity is conducted. This requires imposition of zero restriction on the first column of α coefficient. The results of weak exogeneity test are given in the following table.

Table 3.6 Result of weak exogeneity test (Zero restriction on α co-efficients)

Variables	LnRGDP	LnAID	PA	A^2	INVo	HC	LnLAB
α- coefficients	-0.725075	-5.135677	-3.61e+08	-45451257	3.522394	-2.48e+09	-8.19e-05
2	20.51183	0.418486	0.903671	0.900039	1.031968	0.3766521	0.030889
P-value	0.0006***	0.517693	0.341799	0.341968	0.09697	0.539471	0.860489

Source; Eveiws 6 stastical output of imposing Zero restriction on α co-efficient. Note *** denotes rejection of the null hypothesis at 1% significance level.

The likelihood ratio test of exogenity indicates that except the dependent variable (real GDP) all variables are exogenously determined in the model. The null of weak exogeneity for the dependent variable is rejected at 1% level of significance while for other variables it is not rejected at any conventional level of significance.

Similarly a zero restriction is imposed on long run β coefficients to identify which explanatory variables constituting the growth equation are statistically different from zero.

Table 3.7 Result of Zero restriction test on coefficients

Variables	LnAID	PA	A^2	INVo	HC	LnLAB
β-coefficients	-0.027	-2.24e-06	0.00295	-0.014	-1.10e-10	-5.733
2	4.088618	13.24954	4.175495	40.011	11.776	5. 07356
P-value	0.04636**	0.0002***	0.041013**	0.00000***	0.0006***	0.034728**

Source; Eveiws 6 stastical output of imposing Zero restriction on beta co-efficient. Note ***, **, represents rejection of the null hypothesis at 1%, 5% level of significance respectively.

The result of the likelihood ratio test (the zero restriction tests) performed on the long run coefficients of the explanatory variables shows the statistically significant coefficient different from zero, which allows the estimation of the long run growth equation. The estimated long run growth equation is:

LRGDP = 0.027LAID + 5.733LLAB - 0.00295A^2 + 0.014INVo + 1.10e-10HC + 2.24e-06PA

[4.088618] [5.07356] [4.175495] [40.011] [11.776] [13.24954]

(0.04636)** (0.034728) ** (0.041013) ** (0.00000) *** (0.0006) ***(0.0002) ***

Vector Hetero test: Chi^2(6) =11.37399(0.0775)

Vector AR (1, 2): Chi^2(30) =38.99056(0.1259)

Vector Normality: Chi^2(2) = 0.328147(0.848680)

The long run result depicts that all explanatory variables are significant in affecting growth at five percent level of significance.

The result of the diagnostic test confirms the adequacy of the model. That is, the null of homoscedacity is not rejected at any level of significant; therefore the model is free of hetroscedacity problem. In addition, the null of no serial correlation is not rejected and the test for normality confirmed that the errors are normally distributed and the null is not rejected at any conventional significance level.

Generally, aid has a significant and positive impact on the growth of a country. According to the result a one percent increase in aid will increase RGDP by 0.027 percent. This result is also consistent with the result reached by Tolessa (2001) and Tsegay (2008) in Ethiopia . Also Malik (2008) found that foreign aid has a long run positive impact on growth in Togo. The result also confirms that the impact of aid on growth is significant at 5% level of significant.

Similarly, foreign aid interacted with policy (PA) has a significant positive influence on growth. The positive result is associated with the policy environment (macroeconomic and infrastructure) in the country which makes aid more effective. A comparison of the coefficients of aid and the aid interacted with policy indicator in absolute terms indicate that aid would be more effective had there been a favorable macroeconomic policy environment.

Though the importance of a sound policy environment for growth is unquestionable, but the argument of Burnside and Dollar (1997, 2000) that aid is effective only in a good policy environment is not valid in Ethiopia since aid entered alone has a positive and significant contribution to growth as indicated above. Rather it can be argued that aid is effective in promoting growth in Ethiopia in the period considered; but its effectiveness would have been higher if it was supported by a sound macroeconomic policy environment.

Like the theoretical expectation the Aid squared term, shows that negative and significant impact, suggests that the presence of capacity constraint in absorbing foreign aid beyond some level. In other words, the argument that foreign aid tends to have diminishing returns beyond some threshold level is operate in the Ethiopian situation in the study period considered since countries with low level of human capital and poor institutions are expected to have a capacity constraint in absorbing excessive capital from abroad and The existing situation in Ethiopia is a living example of the scenario. Similar result is obtained by Wondwossen (2003) for Ethiopia Lensink and White (2000) and Burnside and Dollar (1997, 2000) for Developing countries.

Investment, which is not financed by aid, has a positive impact on growth. A unit change in investment which is not financed by aid to GDP ratio, leads to a 0.014 percent change in the real GDP of a country. The above result also confirms that its impact is significant at one percent level of significant.

Human capital has positive impact on the growth of a country. Referring to the result, a change in educational expenditure (a proxy to human capital) by one unit leads to a 1.1 percent change in the real GDP of a country and this result is significant at one percent level of significant.

The other variable which is entered on the long run growth equation is labor force in line with the theoretical expectation has entered with a positive sign and moreover it is significant. It shows that economically active labor force has played a role in promoting growth in the long run.

B. Vector Error Correction Model

Since the variables in the growth equation are found to be co integrated, we proceed to estimate the vector error correction model which represents both the long run and short run adjustments among the variables. The lag changes in the relevant variables represent short run elasticity's (alternatively, short run variation), while the error correction term (ECT) represents the speed of adjustment back to the long run relationship among the variables. A VECM is estimated beginning with the general over parameterized model. Then the VECM is subjected to a systematic reduction and diagnostic testing process until an acceptable parsimonious model is obtained. In the process, all insignificant explanatory regressors with their corresponding lags are dropped until further reduction is rejected (Hendry, 1997).

In the short run dynamic equation, all weakly exogenous variables identified in the long run growth equation are entered in the right hand side of the model in their appropriate lagged difference form. In addition the error correction term with one period lag is also incorporated in the VECM. Using the VECM specification, a short run dynamic equation is estimated for growth function. Dropping insignificant regressors from the specification (i.e. step-by-step elimination of insignificant regressors from the general VECM model) following the general to specific modeling strategy, a parsimonious result for growth is reported below.

Table 3.8 results of Short run equation

Variables	Coefficient	t-value	p-value
D(INVO)	0.002031	0.544025	0.5912
ECT-1	-0.170086	-2.101302	0.0459**
D(ODA2)	9.82E-07	1.001502	0.3262
D(PA)	-1.22E-07	-0.987705	0.3328
D(LNRGDP(-2))	0.361288	2.342078	0.0274**
D(LNODA(-2))	0.050126	1.249248	0.2231
D(HC(-2))	2.93E-12	0.207300	0.8375
D(ODA2(-1))	3.04E-06	2.184942	0.0385**
D(LNLAB)	23.12110	5.762515	0.0000***
D(PA(-1))	-3.28E-07	-2.307906	0.0296**
C	0.063514	5.638379	0.0000***

Note ***,** denotes that rejection of the null hypothesis at 1%,5% level of significance.
R^2 = 0.76 DW= 2. 03 F (10,36)= 74.83738(0.0000)
AR(1-2) =F(2,23)= 0.866839 (0.4336)
ARCH =F(1,33)= 0.317814 (0.5768)
Hetro=F(10,25)= 0.558932 (0.8350)
Normality =Ch^2(2)= 1.238561(0.427652)
Ramsey reset =F(1,24)= 1.290507 (0.2672)

Source; Eveiws 6 stastical output of vector error correction model.

The Goodness of fit of the model (R^2) shows, 76 percent of a variation in the dependent variable (RGDP) is explained by the variation in the explanatory variables included in the model.

The diagnostic test of the short run model for growth shows that there is no problem at all. The tests show that the null of the various tests are not rejected except for the joint insignificance of the explanatory variables i.e. the coefficients of the explanatory variables are jointly significant. The result shows that there is no serial correlation and the errors are normally distributed with constant variance. A test for ARCH is performed but the result failed to reject the null of no autoregressive conditional heteroscedasticity. The Ramsey test for model misspecification confirms that the model is well specified and there is no problem in the specification of the model.

The estimated dynamic equation for growth result indicates that foreign Aid (ODA) has a positive impact on growth as it is expected, however its impact is insignificant in the short run. It point that foreign aid was used to finance investment which has a longer gestation period and its impact may not be reflected in the short run. The aid-policy interaction term has got a negative and significant influence on growth. Moreover, the result indicates that the unfavorable role of poor policies for growth in the short run.

Aid square has appositive and significant impact on growth. The finding reveals that unlike the theoretical expectation there is no capacity constraint in absorbing foreign aid at any level in the short run. In other words, the argument that foreign aid tends to have diminishing returns beyond some threshold level do not operate in the Ethiopian situation in the study period considered only in the short run.

Labor force in line with the theoretical expectation has entered with a positive sign and moreover it is significant. It shows that economically active labor force has played a role in promoting growth both in the short run and long run. Human capital proxed by education expenditure has appositive impact but it is insignificant in the short run.

The error correcting term is statistically significant and between zero and one. The coefficient indicates that RGDP adjusts itself to the equilibrium by 17 percent in one year.

4. Conclusion

The result from the growth equation revealed that aid contributed positively to economic growth in the long run, but its short run effect appeared insignificant indicating that most of the aid has been used to finance investment which has a long gestation period. Similarly, foreign aid interacted with policy (PA) has a significant positive influence on growth only in the long run. The positive result is associated with the policy environment (macroeconomic and infrastructure) in the country which makes aid more effective. A comparison of the coefficients of aid and the aid interacted with policy indicator in absolute terms indicate that aid would be more effective had there been a favorable macroeconomic policy environment.

Therefore, aid is effective in promoting growth in Ethiopia in the period considered; but its effectiveness would have been higher if it was supported by a sound macroeconomic policy environment. Like the theoretical expectation the Aid squared term, shows that negative and significant impact, suggests that the presence of capacity constraint in absorbing foreign aid beyond some level only in the long run while in the short run the result indicates that no capacity constraint in absorbing foreign aid.

Therefore, for the period under consideration aid played a positive role in improving economic growth of Ethiopia. Based on the empirical investigations, the following policy implications are drawn by the researcher that are recommended to be taken by the government of Ethiopia.

Though the view that aid is ineffective but only in a good policy environment is not supported in the period under consideration, the finding points that the importance of a good policy environment to make aid more effective. Thus setting a sound policy environment is crucial to use aid more effectively and make domestic investment efficient. Therefore foreign aid can be used to enhance economic growth.

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