The Impact of Foreign Aid on Economic Growth in Bangladesh: An Modern Time Series Econometric Approach

Zahirul Islam[*]
Shafiun Nahin Shimul[**]

Abstract

This study examined the long run relationship between foreign aid (FAID) and economic growth in Bangladesh using the two modern time series econometric approaches- bound testing Autoregressive Distributed Lag (ARDL) Models or Unrestricted Error Correction Model (UECM) and Engel Granger two step procedures during the period of 1973-2007 and found that FAID and GDP are not co-integrated. However, using Granger Causality test, it was shown that the FAID was not significantly causing the GDP per capita both in the short and long run and for other control variables - openness and FDI- the result was almost same but for capital formation the result was positive. The study suggested taking proper steps so that these variables can be used as contributors to the economic development.

Keywords: Foreign Aid, Foreign Direct Investment, Growth, Co-integration, Bound testing, Engle Granger, Causality.

Introduction:

Foreign aid - usually associated with official development assistance which in turn is a subset of the official development finance- is a voluntary transfer of resources from one country to another, given at least partly with the objective of benefiting the recipient country. Foreign aid is a significant source of foreign capital inflows to developing countries and the important objective of foreign aid to developing countries is to make the enhancement of economic development and welfare, which usually is measured by its impact on economic growth. Yet, after decades of capital transfers to developing countries, and numerous studies of the empirical relationship between aid and growth, the impact of foreign aid in achieving economic development by stimulating growth remains questionable.

The numerous studies show that the debate over the role of foreign aid in economic growth in the recipient country has two strands. One group of the proponents of foreign aid asserts that overseas capital inflow is necessary and sufficient for economic growth in the less developed countries. They claim that there exist a positive relationship between aid and economic growth because it complements domestic resources and also supplements domestic savings. Furthermore, foreign aid helps to reduce the foreign

[*] *Lecturer in Economics, Sadarpur Government College*
[**] *Lecturer, James P Grant School Public Health, BRAC University*

exchange gap, provides access to modern technology and managerial skills, and allows easier penetration into foreign market. This has drawn the attention of many scholars over time (Chenery and Strout (1996), Papanek (1972), Gulati (1975), Gupta (1975), Over (1975), Singh (1985), levy (1988), Snyder (1993), Burnside and Dollar (1997), Fayissa and El-Kaissy (1999), Hansen and Tarp (2000)

Another group claims that external capital exerts significant negative effects on the economic growth of recipient countries. According to this view, foreign aid is fully consumed and substitutes rather than compliments domestic resources. Furthermore, foreign aid assists to import inappropriate technology, garbles domestic income distribution, and encourages a bigger, inefficient and corrupt government in developing countries. This has been drawn from the many studies (Leff (1969), Griffin (1970), Griffin and Enos (1970), Weisskoff (1972a, b), Khan, Hasan and Malik (1992), Shabbir and Mahmood (1992), Boone (1994, 1996), Pedersen (1996), Mahmood (1997), Easterly (1999), Knack (2000), Gong and Zou (2001), Collier and Delh (2001).

However, the relation between foreign aid and economic growth remains inconclusive and is worth being studied further. This study will contribute to the literature in the following perspectives. First, most of the research in the literature has dealt with the relationship between foreign aid and economic growth in developing countries in general with little emphasis on those developing countries in the South Asian countries especially in the case of Bangladesh in particular. Hence, this study will add to the scant literature on Bangladesh. Second, this study uses Engel Granger two step procedure (Engle and Granger, 1987) & Autoregressive distributed lag model (ARDL) by Pesaran and Pesaran (1997) and Pesaran et al (2001) that have been used widely in applied econometrics as compared to basic ordinary least squares (OLS) regression method which did not first investigate the properties of time series, therefore suffers from misleading and fallacious results. Third, this study uses time series that will produce the outcome which may be used to stimulate the policymakers a better guideline to formulate their policies with regards to a better use of foreign aid in order to foster economic growth and development.

Literature Review:

The role of foreign economic assistance in economic development and growth remains debatable in economic literature. Some studies proved its positive impact on the economic development empirically, while some studies highlighted its negative effects as well.

Papanek (1973), in a cross-country regression analysis of 34 countries in the 1950s and 51 countries in the1960s, considering foreign aid, foreign investment, other flows and domestic savings as explanatory variables, finds that foreign aid has a significantly greater effect on growth than the other variables. He observes that “foreign aid, unlike domestic savings, is able to fill the foreign exchange gap as well as the savings gap. Unlike foreign private investment and other foreign inflows, foreign aid is very essential

for economic growth and, more importantly, is biased toward countries with a balance-of-payment constraint". He further observes a strong negative correlation between foreign aid and domestic savings, which he believes co-contribute to the growth performance.

Fayissa and El-Kaissy (1999), in a study of 77 countries over sub-periods 1971-1980, 1981-1990 and 1971-1990, show that foreign aid positively affects economic growth in developing countries. Using modern economic growth theories, they claim that foreign aid, domestic savings, human capital and export are positively correlated with economic growth in the studied countries. This is consistent with the economic theory of foreign aid, which asserted that overseas development assistance accelerates economic growth by supplementing domestic capital formation (Chenery and Strout, 1966).

Snyder (1993) explains the relation between foreign aid inflow and the growth rate of gross domestic product in 69 developing countries over three periods (the 1960s, the 1970s and 1980-1987), incorporating country size (measured by gross domestic product) in the model and claims that when country size is not included, the effects of aid are small and insignificant but when this factor is taken into account, the coefficient of aid becomes positive and significant.

Burnside and Dollar (1997) assert that aid works well in the good-policy environment, which has important policy implications for donors' community, multilateral aid agencies and policymakers in recipient countries. Developing countries with sound policies and high-quality public institutions have grown faster than those without them, 2.7% per capita GDP and 0.5% per capita GDP respectively. One percent of GDP in assistance normally translates to a sustained increase in growth of 0.5% per capita. Some countries with sound policies received only small amount of aid yet still achieved 2.2% per capita growth. The good-management, high-aid groups grew much faster, at 3.7% per capita GDP (World Bank, 1998).

Hansen and Tarp (2000) conduct a regression between aid and the growth. It is observed that aid increases the growth rate, and this result is not conditional on 'good' policy. There are, however, decreasing returns to aid, and the estimated effectiveness of aid is highly sensitive to the choice of estimator and the set of control variables. When investment and human capital are controlled for, no positive effect of aid is found. Yet, aid continues to impact on growth via investment.

Griffin and Enos (1970) claim that foreign aid does not contribute to economic growth and that it fails to foster democratic political regimes as well. Instead, foreign economic assistance could impede economic development by reducing the domestic saving rate. The authors test this hypothesis using a bi-variate regression model with cross sectional data for 32 less developed countries (LDCs) and conclude that foreign aid inflows to LDCs cause the domestic saving rate to fall. Similar conclusion was drawn by John Mbaku (1993).

Leff (1969) and Griffin (1970) have revealed its negative impacts on growth. They showed that the Foreign aid could adversely affect the economic growth by substituting the domestic savings. However, Pedersen (1996) claims that it is still not possible to conclude that aid affects growth positively. Using game theory, he shows that the problems lie in the built-in incentive of the aid system itself. Similar conclusion was drawn by Giles (1994) for Cameron.

Islam (1992) using data from 1972 to 1988 asserts that domestic resources have positive and significant impact on economic growth while foreign resources do not show any significant contribution in Bangladesh. However, after foreign resources are decomposed into different categories, he observes that the loans are more effective than grants and food aid is more effective than project aid.

Some studies were conducted to analyze the impact of aid on savings in Pakistan. Khan, Hasan and Malik (1992) estimated that the foreign capital inflow caused to decrease national savings in Pakistan during the period of 1959-60 to1987-88. Shabbir and Mahmood (1992) also observed the negative impact of foreign capital on the national savings in Pakistan for the same period. Mahmood (1997) observed that country may catch severe debt problems due to macroeconomic mismanagement, misutilization of aid and inappropriate policies.

Aid might have different effects in different developing countries. Chenery and Carter (1973), following the previous two-gap derived model of Chenery and Strout (1966) and using data from 50 countries over the period 1960-1970, show that the effects of official development assistance (ODA) on the development performance of countries under study are different among certain groups of countries. In five countries, namely Taiwan, Korea, Iran, Thailand and Kenya, foreign assistance accelerated economic growth whereas in six cases it hindered growth, i.e. India, Colombia, Ghana, Tunisia, Ceylon and Chile.

Incorporating export price shocks into Burnside and Dollar's (1997) analysis, Collier and Delh (2001) show a significant and negative relation between negative shocks and economic growth. They claim that "the adverse effects of negative shocks on growth can be relieved by offsetting increases in aid". Therefore, they proposed that targeting aid towards negative shock experiencing countries could be more effective than towards good-policy countries. Lensink and Morrissey (2000) explain the impact of aid uncertainty on economic growth in developing countries. They observe that the effect of foreign aid on economic growth is a function of aid levels and the stability of aid flows.

Mosely, Hudson, and Horrel (1987), using aggregate, cross-sectional data, report a negative and significant relationship for the period 1960-1970, but a negative and insignificant relationship for the 1970-1980 and 1980-1983 time frames. Dhakal, Upadhyaya and Upadhyay (1996) run a causality test between foreign aid and economic growth for four Asian and four African countries and find that except for Kenya and Nepal, foreign aid is positively and significantly related to economic growth.

Easterly, Levine and Roodman (2003) run a new test on the previous work of Burnside and Dollar (1997). With a larger sample size (1970 to 1997 compared to BD's 1970-1993), they observe that the result is not as robust as before and therefore claim that the question of aid effectiveness is still inconclusive.

To put it briefly, the study results on the relation between aid and growth vary depending upon the models, data and countries of analysis and the result is not obvious-it could be negative, positive or inclusive. Therefore, the debate over the impact of aid on growth is on-going and so it is imperative to do a study on this regard with particular focus on Bangladesh.

Methodology and Data

Analytical framework and data:

The objective of this study is to find out whether there is any relationship between GDP and foreign aid (FAID).For this perspective we use the aggregate production function which includes foreign aid and other relevant variables in the model. The standard APF (Aggregate Production Function) is widely used in literature (Fosu, 1990; Kohpaiboon, 2004; Mansouri, 2005; Herzer et al, 2006; Feder, 1983; Fosu et al 2006; Ukpolo, 1994) and it incorporates, along with traditional input of production-labor and capital, other unconventional input like FAID, openness which may be influential to growth. The APF model to be used in this study is

$$Y_t = A_t K_t^{\alpha} L_t^{\beta} \quad \text{..... (1)}$$

Where Y_t is the production of the economy which is GDP per capita at time t. A_t, K_t, L_t are the total factor productivity, the stock of capital, the stock of labor respectively. The effect of FAID and other relevant variables can be captured through A_t, component of the APF. However in many cases it is argued that the impact of FAID can be seen correctly if another component which goes along with this like, openness, can be included in the model. As we want to know the effectiveness of FAID on GDP the model will be as follows

$$Y_t = A_t(FAID_t, FDI_t, OPEN_t) K_t^{\alpha} L_t^{\beta} E_t \quad \text{..... (2)}$$

Here E_t is exogenous component of growth. So the equation of the above function will be-

$$Y_t = E_t FAID_t^{\delta} FDI_t^{\zeta} OPEN_t^{\varphi} K_t^{\alpha} L_t^{\beta} \quad \text{..... (3)}$$

Here α, β, δ, φ and ζ are constant elasticity coefficients of output with respect to K, L, FAID, OPEN and FDI. From the equation (3), taking log in both sides the equation will now become

$$LnY_t = c + \alpha \ln K_t + \beta \ln L_t + \delta \ln FAID + \zeta FDI_t + \varphi \ln OPEN + \varepsilon_t \ldots (4)$$

Where all variables as defined and c are constant term and ε_t is white noise error term; α, β, δ, ζ and φ are expected to be positive.

From the equation (4) Y is defined as real domestic product per capita, K is real gross capital formation per capita, as data of fixed capital is not available for Bangladesh; and so gross capital formation has been used as a proxy of capital (K), L is labor force, OPEN is the ratio of sum of export and import values to GDP. The world development indicators (WDI), 2008 was used and the data ranging from 1973 to 2007. FDI is real foreign direct investment per capita and FAID is real foreign aid per capita which is used from the data of official development assistance and all the variables are expressed in Taka and in real terms.

Econometric Approaches:

By conducting traditional OLS method, it is assumed that the data are stationary on their levels, but in practice most economic time series data are not stationary rather they are non-stationary on their levels. But if the variable is not stationary then it can be trend stationary-the non-stationarity problem can be solved by de-trending the variables- or difference stationary- where taking difference after certain times, the data would become stationary. If it is taken difference in d times then it is d difference stationary and it is expressed as I (d). The modern time series econometrics suggests testing the stationary status of the data before conducting the regression because in most of the cases the time series data are non stationary. If with the presence of non-stationary variables , OLS method is applied then the relationship will be spurious but if they are co-integrated then the parameter will be super consistent because in this case variables are moving together which implies that there is some long run relationship between or among the variables in the question. In this study we used two approaches of testing co-integration which is suitable for small sample data - (a) Engel Granger two step procedure (Engle and Granger, 1987) (b) Autoregressive distributed lag model (ARDL) by Pesaran and Pesaran (1997) and Pesaran et al (2001).

(a) Engel Granger two step procedures: First step is to conduct normal OLS on the level forms of the variables and then collect or retrieve residual from this regression and the residual are tested whether it integrated at less order than the expected order of the linear combination of the variables. But before conducting the normal OLS it is necessary to identify the integrated order of the variables. If two variables are I(d) then it is more likely that the linear combination of these variables will be I(d) but if it is I(d-r) where $r<d$ then it is because of the fact that there exists some long run relationship between these variables or we can say that there is some co-integration. According to Engel representation theorem if there is some co-integration then there must be an Error Correction Mechanism (ECM). This process is shown by the following equations in our study where first step is to conduct normal OLS as follows-

$$LnY_t = c + \alpha \ln K_t + \beta \ln L_t + \delta \ln FAID_t + \zeta \ln FDI_t + \varphi \ln OPEN + \varepsilon_t \ldots\ldots\ldots (5)$$

Now, it is necessary to collect or retrieve residual (ε_t) from the above equation then test ε_t to identify the integrated order by usual stationarity test such as ADF and other tests, and this is the second step. If ε_t is less integrated order of the all the variables in the equation (4). According to Granger representation theorem there will be an error correction mechanism which will inserted in the short equations-

$$\Delta LnY_t = c + \sum_{i=1}^{p} \delta_{1i} \Delta \ln K_{t-i} + \sum_{i=1}^{q} \delta_{2i} \Delta \ln L_{t-i} + \sum_{i=1}^{r} \delta_{3i} \Delta \ln FAID_{t-i} + \sum_{i=1}^{s} \delta_{4i} \Delta \ln FDI_{t-i} + \sum_{i=1}^{u} \delta_{5i} \Delta \ln OPEN_{t-i}$$
$$+ \eta_1 ECM_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots (6)$$

Granger causality test: The regression analysis needs one variable to be considered as a dependent variable while other variable as independent but it does not necessarily denote causation rather it may indicate only association where the direction of causation will not be known. Granger (1969) invented a test for causality between and among the variables. However, with the advent of co-integration analysis the test has been modified which incorporates the non-stationary status of the variables which is common the time series data. For the causality test in this model we will use the following procedure

$$\Delta LnY_t = c + \sum_{i=1}^{p} \delta_{1i} \Delta \ln K_{t-i} + \sum_{i=1}^{q} \delta_{2i} \Delta \ln L_{t-i} + \sum_{i=1}^{r} \delta_{3i} \Delta \ln FAID_{t-i} + \sum_{i=1}^{r} \delta_{4i} \Delta \ln FDI_{t-i} + \sum_{i=1}^{s} \delta_{5i} \Delta \ln OPEN_{t-i}$$
$$+ \eta ECM_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots (7)$$

In the equation (7) ECM_{t-1} is the lag of error correction term from the short run EG model. A significant coefficient of the error- correction term indicates that the past errors affect the current value of the variables under consideration and it shows the long-run causality. The short run causality can be captured by the variables with difference term. FAID will cause growth in the short run if the difference terms variables of FAID are jointly significant.

(b) Bound testing Autoregressive distributed lag model (ARDL) or Unrestricted Error Correction Model (UECM): This method has some special advantages over other relevant alternatives. Firstly, this approach is simple to analyze and to conduct as it allows using OLS, once lag order can be identified. Secondly, it can be conducted irrespective to the order of the variables either I (0) or I (1). Finally, for small or finite sample data it is relatively efficient method but the limitation of this method is that this procedure will not work in the presence of I(2) series. In this approach, the long run relationship and the short run dynamic interactions among variables can be tested using ARDL or bound testing estimation method. The model for this approach will be

$$\Delta LnY_t = c + \sum_{i=1}^{p} \delta_{1i} \Delta \ln K_{t-i} + \sum_{i=1}^{q} \delta_{2i} \Delta \ln L_{t-i} + \sum_{i=1}^{r} \delta_{3i} \Delta \ln FAID_{t-i} + \sum_{i=1}^{s} \delta_{3i} \Delta \ln FAID_{t-i} + \sum_{i=1}^{u} \delta_{4i} \Delta \ln OPEN_{t-i} + \vartheta_1 \ln Y_{t-1} + \vartheta_2 \ln K_{t-1}$$
$$+ \vartheta_2 \ln L_{t-1} + \vartheta_4 \ln FAID_{t-1} + \vartheta_5 \ln FDI_{t-1} + \vartheta_6 \ln OPEN_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

There are two steps for implementing the ARDL approach to co-integration procedure. At first, we require to test the existence of long run relationship among the variables in the system where null hypothesis of having no co-integration or no long run relationship among the variables in system, $H_0 : \vartheta_1 = \vartheta_2 = \vartheta_3 = \vartheta_4 = \vartheta_5 == \vartheta_6 = 0$, is tested against the alternative hypothesis $H_1 : \vartheta_1 \neq \vartheta_2 \neq \vartheta_3 \neq \vartheta_4 \neq \vartheta_5 \neq \vartheta_6 \neq 0$ by using F-statistic. As usual F-statistic value is not standard, Pesaran and Pesaran (1997) and Pesaran et al (2001) suggested different critical values for this system. For each cases there are two critical values-one upper bound and a lower bound considering the integrated order of the variables, either I(0) or I(1). If the computed F-statistic is higher than the appropriate upper bound of the critical values, the null hypothesis of no integration is rejected; and if it is less than the lower bound then, null cannot be rejected; if it is within these two bounds then the test is inconclusive regarding integration between or among the variables.

Empirical results and discussion

Unit roots test: Before performing any of the models, we have to test the stationary status of the variables on their level and difference form. For both Engel Granger (EG) model and Bound testing ARDL model this step is necessary. In EG model it is necessary for testing the residuals and in ARDL it is necessary to make sure that no variables are integrated of order more than 1, because if variables are integrated of order more than 1 ARDL will not work. Augmented Dickey-Fuller (ADF) test and Phillips Perron (PP) test have performed to identify the integrated order of the variables. For the unit root tests it is important to identify the lag order and Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) and other information criteria such as FPE were used to identify the exact lag order. Table 1 shows the stationary status of the variables on their level and first difference forms. From the table-1 it is evident that the six variables in our model that is Ln (GDP), Ln (Foreign Direct Investment), Ln (Foreign id), Ln (Capital formation), Ln (Labor force); and Ln (OPEN) are not stationary on their level and this result is justified by the ADF test and Phillips Perron (PP) test both with and without including trend terms. For some variable (such as Ln of Labor force) were not I (1) by ADF test but I(1) by PP test and as PP test is better than ADF test, the conclusion drawn that all the relevant variables of our model are not stationary on their level but entire variables have become stationary after first difference that is all variables are I(1).

Table1: Unit root test for the variables under study using ADF, PP tests

Variable	*ADF Test*		*PP Test*		*Conclusion*
	With constant (lag^2)	With con and trend(lag)	With constant(lag)	Constant and Trend	
Ln(GDP)	1.025(3)	-1.048(3)	1.001(3)	-2.298(3)	I (1)
Δ Ln(GDP)	-5.773**(1)	-6.013**(1)	-7.784**(1)	-7.818**(1)	
Ln(FDI)	-0.731(1)	-3.709*(1)	-0.903(1)	-3.283(1)	I (1)
Δ Ln(FDI)	-4.875**(0)	-4.791**(0)	-5.052**(0)	-4.954**(0)	
Ln(FAID)	-1.040 (2)	-1.825 (2)	-1.448 (2)	-3.673* (2)	I (1)
Δ Ln(FAID)	-4.010**(1)	-3.768*(1)	-7.970 **(1)	-7.753 **(1)	
Ln(K)	-1.069(3)	-2.846(3)	-1.16(3)	-2.309(3)	I (1)
Δ Ln(K)	-2.817**(2)	-2.784(2)	-3.871**(2)	-3.771**(2)	
Ln(L)	-0.844(2)	-1.939(2)	-1.24(2)	-1.430(2)	
Δ Ln(L)	-2.422(1)	-2.509(1)	-3.441**(1)	-3.513**(1)	I (1)
Ln(OPEN)	-0.366(2)	-1.122(2)	-0.046(2)	-2.890(2)	I (1)

Engel Granger (EG) two step procedures: For testing long-run co-integration, in Engel-Granger Two step procedure, the first step is to conduct the long run equation using usual OLS. EG states that if the variables are I (1) on their level (as in our study) but the linear combination is I (0) then the variables are co-integrated; and according to the EG representation theorem if they are co-integrated then there might be ECM (Error Correction Mechanism). The long run OLS model is as follows

$$LnY_t = 2.1367 + 0.4966 ** \ln K_t + 0.0592 \ln L_t - 0.0010 \ln FDI_t$$
$$- 0.0152 \ln OPEN_t + 0.0202 \ln FAID \text{.....(9)}$$

** means significant at 10% level and ** indicates significant at 5% level of significance.*

From this model we retrieved the residual (EC) and performed the ADF test with and without trends and it is stationary as test statistic with and without trend is -4.799 and-4.631 which are significant indicating that the residual is stationary and it is also significant when we used PP test and so from these tests' result it can be said that there exists a long run relationship among these variables and according to their EG representation theorem there exists an ECM the model and it is shown in the following table :-

Table 2: Error correction mechanism of EG method with short run dynamics

(Pradhan G. 2008) (Pradhan G. 2008)[2] The lags were determined using the Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) and other information criterion such as FPE and HQIC
Note: * denotes significant at 5% level and ** indicates significant at 1% level.

Variable	Coefficient	p-value
Constant	-0.02000	0.428
ΔlnFAID	-0.0049	0.544
ΔlnFDI	0.0018	0.810
ΔlnK	0.5321	0.000
Δ^2lnK	0.1011	0.135
ΔlnL	0.9043	0.403
ΔlnOPEN	-0.0339	0.548
ECM_{t-1}	-0.5957	0.077
Adj. R^2	0.8383	
RESET test for functional form	0.42	0.7442
Test for Heteroscedasticity	2.35	0.3091
JB for Normality, Chi^2	1.21	0.2704

From above table and from the equation (7) it is evident that Ln FAID is not influencing the GDP both in short and long run. Although the coefficient of ln FAID has positive expected sign but it is not significant. The only variable which is significant both in short run and long run in determining GDP per capita is lnK. The openness variable is significant neither in short nor in long run and it has assumed wrong sign. The EC term is -0.5957 which is negative and the absolute value is less than unity which is expected and it implies that 59.57% of the equilibrium has been corrected in one year if there is a shock. This model has also passed all the diagnosis tests as none of the relevant computed statistics is significant which implies that there is no problem of heteroscedasticity, normality, and functional form in the ECM model

Granger Causality test:

Table 3: Granger Causality test equation using equation (7)

Causality	Null Hypothesis	*p*-value
Δ*Ln(FAID)*	$\delta_3=0, \forall i$	0.3345
Δ*Ln(FDI)*	$\delta_4=0, \forall i$	0.2114
Δ*Ln(K)*	$\delta_1=0, \forall i$	0.0003
Δ*Ln(L)*	$\delta_2=0, \forall i$	0.1563
Δ*Ln(OPEN)*	$\delta_5=0, \forall i$	0.0277
Test of joint significance	$\delta_1= \delta_2= \delta_3=\delta_4= \delta_5=0, \forall i$	0.0017
Error Correction term	ECM, $\eta=0$	0.077

Note: $\forall i$ means for all *I*

From the Granger causality test it is evident that the FAID is not a good predictor of GDP growth neither in short run as FAID coefficient is not significant nor in the long run as the EC term is insignificant. On the other hand other control variables such as foreign direct investment, labor force, and openness are not predictors of GDP growth too. But, capital formation causes GDP. The causality from GDP to FAID was not performed as it was not required according to our objective. Moreover, labor force does not also cause GDP growth in Bangladesh and this is mainly due to less productivity of the labor. As the openness and foreign direct investment are also not determining variables of GDP, this finding undermines the importance of external sector in Bangladesh economy.

Bound testing ARDL model or Unrestricted Error Correction Model (UECM):

As none of our variables are integrated order more than 1 so it is possible to run the bound testing or ARDL model and the results are in the following-

Table 4: ARDL Model: Dependent variable is Δ Ln (GDP)

Variable	Coefficient	(p-value)
Constant	4.630288	0.061
$\Delta Ln(FAID)$	-.0396828	0.335
$\Delta Ln(FDI)$	.0040678	0.211
$\Delta Ln(K)$	.8773655	0.000
$\Delta^2 Ln(K)$	-.0640099	0.439
$\Delta Ln(L)$	-2.930405	0.156
$\Delta Ln(OPEN)$	-.2617752	-0.028
$LnGDP_{t-1}$	-1.422971	-0.016
$LnFAID_{t-1}$	-.0413572	-0.569
$LnFDI_{t-1}$	.0083327	0.069
LnK_{t-1}	1.112346	0.009
LnL_{t-1}	-.1807204	-0.347
$LnOPEN_{t-1}$	-.4595788	-0.044

Adj R^2=0.9679 F=17.61 (p value=0.000)

Ramsey RESET test for model specification,

F=3.15 (p=0.1484)
Test for Heteroscedasticity $Chi^{2=}$2.13(p=0.1445)

Jarque Bera test for Normality, Chi^2=1.37 (p=0.5037)

From the result mentioned in the above table, we performed bound tested F –test for the coefficient of one period lag of lnGDP, lnFAID, lnFDI, lnK, lnL, lnOPEN and the F-statistic is 3.15 which falls below the lower bound critical F-statistic suggested by Pesaran et al (1997, 2001) which indicates that there is no clear evidence of having any

long run relationship among these variables. In case of diagnosis test, it is observed that the model does not suffer from the problem in specification as Ramsey's RESET *F* statistic is insignificant as well as there is no problem of normality in this model as *p* value for Jarque-Bera χ^2 test is 0.50 (see the table 3). For robustness of the result ECM-t test, where all the lagged terms are replaced by the error correction term of short run equation that was used in EG model and that also found that the ECM variable is insignificant indicating there is no long run relationship between or among these variables.

From the above results it is now evident that there is no strong evidence of relationship between foreign aid and economic growth for the given time period for Bangladesh because all the approaches-Granger two step procedure; Granger causality test; Bound testing approach failed to show any causal relationship from foreign aid to GDP growth. Interestingly, no other variable that relates to the external economy was found to be significant for determining economic growth. Other relevant variables such as openness, foreign direct investment, which are claimed as requirements for economic development, are found as insignificant. Surprisingly, many of them assume wrong sign as it was expected. The only variable is capital, which was found to be significant and important, which is basically a domestic factor although some contribution may be from the outside economy and this finding is consistent with the finding of this type study done for Bangladesh by Islam (1992). The study results fail to support the findings of Papanek (1973), Fayissa and El-Kaissy (1999), Chenery and Strout, (1966), Snyder (1993), and Dhakal, Upadhyaya and Upadhyay (1996) The study result of this paper is consistent with the findings of the different studies (Shabbir and Mahmood (1992), Collier and Delh(2001), Mosely, Hudson, and Horrel (1987)

Conclusion and Policy implication:

Although it is observed in the development arena that foreign direct investment, foreign aid and openness are important contributing factors for economic development but the present study did not find any strong relationship for Bangladesh. The gross capital formation is a more important criterion of growth. This finding provides some important policy implications. Firstly, only getting the FAID cannot necessarily bring economic development. So the Government should not depend only on FAID but also consider the other factors that can contribute to the economy positively. Secondly, even though FDI, FAID and openness are believed to be significant predictors of GDP but it is not verified by the data. So it is urgent for the government to pay attention to other factors which were necessary for supporting these variables working for the growth. Thirdly, FAID as such cannot bring any positive outcome but the way it invested and the sector in which this investment goes is also equally important. Before taking conclusion one must consider the limitation of the study also. Firstly, due to the absence of some variables, proxies of that variables were used which might have some effect on the result. Secondly, only one model of growth or production function was used and using other models could have some impact on the result we reached.

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