

# The Effect of Technical and Non-technical Aid on the Economic Growth of Bangladesh and other Developing Countries

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**Technical assistance** is recorded by the OECD under “technical cooperation”.

“Technical co-operation is defined as activities whose primary purpose is to augment the level of knowledge, skills, technical know-how or productive aptitudes of the population of developing countries, i.e., increasing their stock of human intellectual capital, or their capacity for more effective use of their existing factor endowment.”

Technical assistance is intended to fill skills and knowledge gaps in developing countries.

TA comes in **two forms**:

- either it is linked to other aid projects, providing the **technical component and expertise for these aid projects**, or
- constitutes freestanding initiatives **focusing on training and skills transfer**.

- Does the Technical Aid (TA) and Non-technical Aid (NTA) have any effect on the economic growth of the developing countries?
- What is the effect of TA and NTA on Bangladesh's economic growth?
- How does the findings compare to similar previous researches?

## Decades of Diverse Findings

- Milton Friedman (1958), Peter Bauer (1972), and William Easterly (2001) have mentioned that aid has **enlarged government bureaucracies, perpetuated bad governments, enriched the elite in poor countries, or just been wasted.**
- Jeffrey Sachs (2004), Joseph Stiglitz (2002), James D. Wolfensohn, Nicholas Stern and others (2002) have argued that although aid has sometimes failed, it has **supported poverty reduction and growth** in some countries and **prevented worse performance** in others.
- Griffin and Enos (1970) report zero or negative bivariate correlation between aid receipts and growth in 27 countries.
- Boone (1996), across 96 countries, between 1971 and 1990, finds no relationship between aid receipts and investment.
- Veiderpass and Andersson's (2007) findings were inconclusive and the researchers could not find any clear pattern in the relation between aid and efficiency.

## Decades of Diverse Findings (cont.)

A summary drawn from different reviews point out **three broad views** have emerged on the relationship between aid and growth:

1. Aid has a **positive relationship** with growth on average across countries (although not in every country)
2. Aid has **no effect** on growth, and **may actually undermine growth**
3. Aid has a **conditional relationship** with growth, helping to accelerate growth under certain circumstances

- Dividing the foreign aid into **technical assistance** and **non-technical assistance**
- Analyze data for a **longer period of time** i.e. 44 years of data from 1971 to 2014
- Analyze **other developing countries** in the panel data analysis
- Analyze Bangladesh data for longer time period, and dividing aid between TA and NTA in the time series analysis

This paper demonstrated that:

- when foreign aid takes the form of technical and non-technical assistance, its effects on improving economic conditions in less-developed countries (among the 36 sampled countries) are inconclusive and without any clear pattern
- whereas, for Bangladesh, technical assistance can have a negative significant, and non-technical assistance a positive but insignificant impact.



- Based on a **small open economy** version of the **Solow and Swan growth model** (Solow 1956) (Swan 1956).
- Consider a **Cobb-Douglas production function** of a given recipient country of foreign aid
- Follow the derivation methodology from a previous literature by Annen and Kosempel (2009).

- Start with:

$$Y_t = E_t K_t^\alpha L_t^{1-\alpha}$$

- Come up with the extended model for panel data analysis:

$$y_{i,t} - y_{i,t-1} = b_0 + b_1 y_{i,t-1} + b_2 TA_{i,t} + b_3 NTA_{i,t} + b_4 X_{i,t} + \phi_i + \varphi_t + \epsilon_{i,t}$$

- For time series analysis:

$$y_t - y_{i,t-1} = b_0 + b_1 TA_t + b_2 NTA_t + b_3 X_t + \epsilon_t$$

- TA affects the production technology
- NTA affects the resource constraint
- The population and technology grow at the exogenous rates
- Aid is temporary
- The aid variables converge to their steady-state values at constant rates
- Technology growth is assumed to be constant and equal across countries

- Augmented Dickey Fuller (**ADF**) [1979] and Phillips-Perron (**PP**) [1988] test was used to test for unit roots
- Fixed Effect (**FE**) and **AB-BB** [Arellano and Bond (1991), Blundell and Bond (1998)] estimators were used in the panel data analysis
- In the FE estimator, **time and country fixed effects** are used.
- Country fixed effect is used to properly control for unobserved time invariant variables that may be correlated with some of the independent variables.
- By using fixed effects, we can avoid the limitations of institutional measures. Furthermore, fixed effects will also control for other permanent factors such as culture and initial level of technology (Glaeser, et al. 2004).

- Using a fixed effect estimator (FE), however, raises econometric issues.
- **AB-BB** estimators are able to address the problem of unobserved country fixed effects which do not require the strict exogeneity assumption.
- AB-BB allows  $\epsilon_t$  to be correlated with future values of the other right-hand side variables (but not with current and past values) which is consistent with the generalized method-of-moments (GMM).
- In estimation AB-BB, aid variables are endogenous variables and investment/GDP is a predetermined variable and instrumented by all their lags.
- Sargan test of overidentifying restrictions is performed.
- AB(1) and AB(2) or Arellano-Bond test for first and second order zero autocorrelation was used.

- Autoregressive Distributed Lag (**ARDL**) approach to cointegration [(Pesaran, Shin and Smith 1996)] was used in the time series analysis.
- The main advantage of the approach is that it can be applied irrespective of whether the regressors are  $I(1)$  or  $I(0)$ .
- Some of the tests conducted:
  - F-test for **cointegration** (Pesaran and Shin, 1995)
  - Breusch-Godfrey Serial Correlation LM Test to test for **serial correlation**
  - Ramsey's RESET test for the test for **functional form**
  - **Normality** test proposed by Bera and Jarque (1981)
  - Breusch-Pagan-Godfrey test for **heteroskedasticity**.
- All estimations are carried out in **Eviews 9.5**, and cross-checked using **StataSE 12** in the Windows 10 64bit platform.

- $y_t$  is the logarithm of **real per capita GDP**
- $TA_t$  is the logarithm of one plus the average of **per capita TA**
- $NTA_t$  is the average of **non-technical aid receipts per capita** during period  $t$  divided by **GDP per capita**
- $X_t$  is a vector of control variables that affect the steady state of country such as the logarithm of the **investment rate**, **population growth**, and the **credit constraint** parameter
- Use **Openness** and **Money/GDP** lagged as proxy for the credit constraint of a country
- Include **inflation** as an additional control variable, thereby following Burnside and Dollar (2000)
- Additionally  $\varphi$  and  $\phi$  are **country and time fixed effects**.

## Developing Countries

Angola, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Djibouti, Equatorial Guinea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lao PDR, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda and Zambia.

## Sources

- **World Economic Outlook** (IMF 2016)
- **Penn World Table** (Feenstra, Inklaar and Timmer 2016)
- **Bangladesh Economic Review** (Ministry of Finance, GoB 2014)
- **OECD database** (OECD 2016).

- The ADF and Phillips-Perron tests confirm the stationarity of each of the series at their first difference both at 5 and 1 percent levels of significance.
- The FE and AB-BB estimates were differently biased towards technical aid and non-technical aid reporting different signs and significance.
- In the FE estimate, the countries in the sample exhibit conditional convergence, with convergence rate of 3 percent, but in the AB-BB estimate it does not exhibit conditional convergence.

FE Estimator results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	*** -0.029	0.008	-3.49	0.000
TA	0.014	0.009	1.47	0.141
NTA	*** -0.478	0.153	-3.11	0.001
LNINV	*** 0.015	0.005	2.63	0.008
LNPOPGR	-0.001	0.009	-0.01	0.989
LNMYNY(-1)	-0.001	0.006	-0.27	0.781
INF	* 0.000	0.000	1.71	0.086
OPN	-0.000	0.000	-1.37	0.169

AB-BB Estimator results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.000	0.004	0.00	0.999
TA	*** -0.009	0.003	-2.76	0.009
NTA	0.050	0.112	0.45	0.658
LNINV	*** 0.014	0.003	4.12	0.000
LNPOPGR	-0.002	0.008	-0.34	0.738
LNMYNY(-1)	-0.001	0.006	-0.20	0.846
INF	*** 0.000	0.000	5.59	0.000
OPN	** 0.000	0.000	2.45	0.020



- In total 62,500 model specifications were analyzed.
- Finally, an ARDL(1, 0, 0, 4, 1, 2, 4) model was selected by the lowest AIC criteria.
- The model passed the diagnostics tests of auto-correlation, normality, specification, hetroskedasticity, and parameter constancy test.
- F-statistic is higher than the upper bounds at all levels, so there is cointegration among the set of  $I(0)$  &  $I(1)$  variables
- We can assume that there can be at least long run or short run relation among these variables.
- The TA has a negative significant effect, and the NTA has a positive insignificant effect on per capita GDP.
- With a coefficient of 0.97, the error correction coefficient suggests a high speed of convergence to equilibrium.

ARDL estimation results (Short Run Coefficients)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TA)	-0.021	0.068	-0.306	0.764
D(TA(-1))	0.088	0.056	1.572	0.137
D(TA(-2))	-0.044	0.053	-0.819	0.425
D(NTA)	0.958	3.830	0.250	0.806
D(LNINV)	** -0.147	0.054	-2.722	0.016
D(LNINV(-1))	0.002	0.048	0.034	0.973
D(LNINV(-2))	-0.014	0.042	-0.324	0.750
D(LNINV(-3))	0.010	0.039	0.249	0.807
D(LNPOPGR)	0.409	0.627	0.653	0.524
D(LNPOPGR(-1))	-0.640	0.920	-0.696	0.497
D(LNPOPGR(-2))	0.125	0.441	0.284	0.780
D(OPN)	0.006	0.005	1.172	0.260
D(OPN(-1))	0.008	0.006	1.513	0.151
D(INF)	*** -0.003	0.001	-3.150	0.007
D(INF)	-0.191	0.122	-1.569	0.137
ADJ	*** -0.970	0.151	-6.410	0.000

ARDL estimation results (Long Run Coefficients)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TA	*** -0.298	0.071	-4.186	0.001
NTA	5.490	3.980	1.379	0.188
LNINV	-0.080	0.067	-1.189	0.253
LNPOPGR	** -0.207	0.080	-2.592	0.020
OPN	-0.010	0.008	-1.338	0.201
INF	*** -0.008	0.003	-3.018	0.009

- In the panel data analysis, could not find any clear pattern in the relation between TA/NTA and per capita real GDP.
- In the time series analysis, there is at least long run or short run relation among these variables. The TA has a negative significant effect, and the NTA has a positive insignificant effect on per capita real GDP.

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**THANK YOU**