FDI and Economic Growth: An Empirical Investigation of India and Bangladesh

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ABSTRACT

This study examines the effect of foreign direct investment (FDI) on economic growth in Bangladesh and India. The study also identifies the motivating factors and problems of FDI inflows in Bangladesh and India. We employ bivariate regression, ordinary least squares (OLS), and Granger causality estimation to examine the effect of FDI on GDP growth in Bangladesh and India using data for the period 1974-2014. The bivariate regression results find that FDI is positively correlated with GDP growth and have positive effect on economic growth for both countries. The regression results indicate that FDI is positively correlated to the economic growth of Bangladesh but it has not yet been established as a significant determining factor for the economic growth. On the other hand, the result indicates that FDI is negatively correlated to the economic growth in India and it has not yet been established as a significant determining factor for the economic growth. It cannot be said that FDI has a positive or negative impact on economic growth both the countries. We conclude that the effect of FDI on economic growth is ambiguous for both India and Bangladesh.

Keywords: FDI, Granger Causality, Economic Growth, Bivariate Regression.

1.0 Introduction

Foreign direct investment (FDI) is often seen as important catalyst for economic growth in the developing countries. The relationship between FDI and economic growth has long been a subject of great interest in the field of international finance. In the era of volatile flows of global capital, the stability of FDI emerges as an effective channel to faster growth in developing countries, particularly in relation to Least Developed Countries (LDCs).

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The Neo-classical growth model as well as endogenous growth models provides the basis for most of the empirical work on the FDI-growth relationship. The gains from FDI inflows are unquestionable as it contributes to economic growth through an increase in productivity by providing new investment, better technologies and managerial skills to the host countries. The impact of FDI on economic growth depends on the degree of capacity of the host country to use FDI efficiently. Similarly, trade liberalisation may facilitate economic growth through efficiency in production by utilising the abundant factors of production more effectively and absorbing better technologies from advanced countries. On the one hand, it may harm the growth process through various forms of macroeconomic instability such as terms of trade deterioration and balance of payments crisis. Therefore, it is a challenge for developing countries to find out the appropriate direction of the role of FDI and trade liberalisation in economic growth.

The basic shortcoming of conventional neo-classical growth models, as far as FDI is concerned, is that long-run growth can only be achieved by technological progress, which is considered to be exogenous factor. FDI would only affect output growth in the short run and, in the long run, under the conventional assumption of diminishing returns to capital inputs with a given technology, FDI would have no permanent impact on output growth. Within the new growth framework, FDI is treated as one of the factor inputs along with labour and capital and is expected to promote growth in the long run. Whether technological progress is best described as exogenous to the world as a system, the role of FDI in diffusing technology to developing countries? Consequently, a positive relationship between FDI and long run growth in a developing host country is expected.

It should be pointed out that the direction of causation may run either way. The FDI may be drawn to regions of faster growth or greater potential because their growth prospects have made it more attractive to foreign TNCs. De Mello (1997) envisions a case in which the size of the consumer market in a recipient economy is getting larger, as a result of faster growth leading to rapid increases in the potential purchasing power of consumers in a host country. Consequently, it is tenable that growth itself may be an important determinant of FDI in addition to those listed above.

As part of developing countries, both India and Bangladesh were also concerned with issues pertaining to foreign private capital inflow and trade liberalisation initially. However, they later moved to liberalise their trade and investment policies to include various investment incentives, particularly, for foreign investors. Along with these, Bangladesh and India has maintained high and steady economic growth, single-digit inflation rate; have a growing domestic market, a large number of low-paid workers with growing number of skilled personnel and a more favourable investment climate. As a
FDI and Economic Growth: An Empirical Investigation of India and Bangladesh

consequence, India or Bangladesh, as a host country, has been successful in attracting a significant amount of FDI and raising its volume of trade (export plus import) as percentage of GDP during the last two decades. The question which naturally arises here is whether the increase in growth was brought about by trade liberalisation and FDI inflows. Therefore, it is important to explore the impact of FDI on the growth process, quantitatively, in Bangladesh and India for a better understanding about the linkages among FDI and economic growth.

The present study is a modest attempt to examine the empirical relationship between FDI and economic growth in India and Bangladesh from 1974 to 2014. The main focus of this study lies in analysing the behaviour of some selected macroeconomic indicators accompanying the surge in inflows of foreign direct investment into India and Bangladesh since 1976 the year in which the inflows started entering on a significant scale. The econometric methodology used in this study is time series analyses, with bivariate regression, Granger causality test, and Ordinary Least Squares regression. These techniques allow us to capture the short-term and long-term effects of FDI inflows. Data on the relevant variables has been used for the time period between 1974 to 2014. The remaining paper is organised into six sections including earlier introduction. Section 2 describes the review of earlier theoretical and empirical literatures. Section 3 discusses the relationship between FDI and economic growth. Section 4 reports the data, methodology and model specification. The empirical findings are reported in Section 5. Section 6 presents conclusion with some observations.

2.0 Literature Review

While FDI involves partial or total ownership of firms located in another country, it is considered beneficial, particularly for developing countries. FDI contributes to growth through several channels. It directly affects growth through being a source of capital formation. As a part of private investment, an increase in FDI will, by itself, contribute to an increase in total investment. An increase in investment directly contributes to growth. A large number of studies have been done in the field of FDI and economic growth. Some of the major studies are reviewed and discussed below.

Khawar (2005) examines the impact of contemporaneous foreign direct investment on growth in the period 1970-92 using the method of ordinary least squares (OLS). The study finds that FDI is significant and positively correlated with growth as well as domestic investment. The population growth rate, initial GDP and political instability variables were negatively correlated with growth, which is keeping with the findings in the empirical growth literature. The human capital measure was not
significant in the analysis.

Hansen and Rand (2005) analyse the casual relationship between FDI and GDP in a sample of 31 developing countries. Using estimators for heterogeneous panel data, they found a unidirectional causality between FDI to GDP ratio implying that FDI causes growth. Borensztein et al. (1998) find that FDI is more productive than domestic investment only when the host country has a minimum threshold stock of human capital. De Mello (1999) finds a positive impact for FDI on output growth regardless of the technological status of a host country as a technological leader.

Dritsaki, et al. (2004) investigate the relationship between trade, FDI and economic growth for Greece over the period 1960-2002. The cointegration analysis suggests that there is a long run equilibrium relationship. They also use the granger causality test and the results show that there is a casual relationship between the variables. A similar type of study regarding the relationship between FDI and economic growth for Cyprus, 1976-2002 is undertaken by Feridun (2004) using the methodology of granger causality and strong evidence emerges that the economic growth as measured by GDP in Cyprus is Granger caused by the FDI, but not vice versa. Flexner (2000) employs Ordinary Least Squares (OLS) estimation to examine the effect of FDI on per capita GDP growth over the period 1990-1998 and finds that FDI has a statistically significant impact on per capita GDP growth.

Chowdhury and Mavrotas (2003) examine the casual relationship between FDI and economic growth for Chile, Malaysia and Thailand using time series data covering the period 1969-2000 and their empirical findings clearly suggest that GDP causes FDI in the case of Chile and not vice-versa, while for both Malaysia and Thailand, there is a strong evidence of a bi-directional causality between the two variables. Athukorala (2003) examine the relationship between FDI and GDP using time series data from the Sri-Lankan economy. Their econometric result shows that FDI inflows do not exert an independent influence on economic growth. And also the direction of causation is not towards from FDI to GDP growth but GDP growth to FDI.

Bhattia, et al. (2005) examine the relationship between FDI and economic growth for twenty OECD countries over the period 1981-2000 by using econometric methodology and their empirical findings clearly suggest that, FDI does not have statistically significant effect on economic growth for those investigated OECD Countries. Lensink and Marrissey (2001) estimate the standard model using cross section, panel data and instrumental variable techniques and find that FDI has a positive effect on growth whereas volatility of FDI has a negative impact. They also find that the evidence for a positive effect of FDI is not sensitive to which other explanatory variables
Empirical findings have so far not offered clear-cut conclusion with respect to the causality between FDI and growth. The surge of FDI might be associated with domestic policy variables. De Mello (1996) finds that FDI plays a determinant role in increasing both output and Total Factor Productivity (TFP) in Chile, while capital accumulation and TFP growth precede FDI in Brazil. In both cases the direction of the relevant causalities cannot be determined. The direction of causality between FDI and growth may well depend on the determinants of FDI. If the determinants have strong links with growth in the host country, growth may be found to cause FDI, while output may grow faster when FDI takes place in other circumstances (De Mello, 1997).

3.0 Relationship between FDI and Economic Growth

The gains from FDI inflows are unquestionable because it contributes to economic growth through an increase in productivity by providing new investment, better technologies and managerial skills to the host countries. However, the effect of FDI on domestic investment is an issue of concern because there is a possibility of displacement of domestic capital due to competition from foreign investors with their superior technologies and skills. Thus, the ultimate impact of FDI on economic growth depends on the degree of capacity of the host country to use FDI as efficiently as possible. Similarly, trade liberalisation may facilitate economic growth through efficiency in production by utilising the abundant factors of production more effectively and absorbing better technologies from advanced countries on the one hand; it may harm the growth process on the other through various forms of macroeconomic instability such as terms of trade deterioration and balance of payments crisis. Thus, it is a challenge for developing countries to find out the appropriate direction of the role of FDI and trade liberalisation in economic growth.

As part of developing countries, South Asian economies were also concerned with issues pertaining to foreign private capital inflows and trade liberalisation initially. However, they later moved to liberalise their trade and investment policies to include various investment incentives, particularly, for foreign investors. Along with these, South Asian countries have maintained high and steady economic growth, single-digit inflation rate; they have a growing domestic market, a large number of low-paid workers with growing number of skilled personnel and a more favourable investment climate. As a consequence, South Asia, as a group, has been successful in attracting a significant amount of FDI and raising its volume of trade (export plus import) as percentage of GDP.
during the last two decades. The question which naturally arises here is whether the increase in growth is brought about by FDI inflows. Therefore, it is important to explore the impact of FDI on the growth process, quantitatively, in South Asian economies for a better understanding about the linkages among FDI and economic growth.

Development economists have long argued that countries pursuing outward-oriented development strategies are more likely to achieve higher rates of economic growth than those that are internally focused. A number of studies have examined the relationship between inward foreign direct investment (FDI) and economic growth in the developing host countries. A generally accepted conclusion is that FDI has played a significant role in promoting economic growth in host countries because FDI represents “the transmission to the host country of a package of capital, managerial skills, and technical skills” (Dattaray, 2003). A significant finding of previous studies is that the economic and technological conditions of a recipient economy manipulate the extent to which FDI contributes to growth.

4.0 Research Methodology

4.1 Description of data and sources

The relationship between FDI and economic growth is examined using data from Bangladesh and India over the period from 1974 to 2014. Secondary data for this study are collected from Global Development Finance (GDF) and World Development Indicators (WDI); WDI-CD ROM Version 2014 published by the World Bank, World Investment Report (WIR) published by the UNCTAD, and International Financial Statistics (IFS) published by the International Monetary fund (IMF), Bangladesh Economic Survey, Economic Survey (Government of India), BBS (Government of Bangladesh). The WDI and IFS database includes variables such as GDP, per capita GDP, GDP growth rates, FDI, trade of goods and services, domestic capital formation, school enrolment, market openness (data of export & import), domestic savings and government expenditures, etc.

4.2 Description of variables

The description of the variables used in this study and the way data has been constructed for each variable is given below.

**FDI inflows are net inflows** of investment to acquire a lasting management interest in an enterprise operating in an economy other than the home country of the investor. The measure is the sum of equity capital, reinvestment of earnings, other long-term, and short-term capital as shown in the balance of payments. No private portfolio
investment is considered in this study. Data of net inflows of FDI as percentage of GDP is collected from WIR and WDI: CD-Rom versions.

*GDP* in current market price and *per capita GDP* data have been collected from various publications of World Bank, UNCTAD, and IMF. The data on annual growth rate of GDP is from World Bank Publications and Economic Survey of India.

*Degree of openness (XM)* has been calculated as the sum of exports and imports divided by GDP. This ratio of trade to GDP provides a measure of the degree of economic openness.

*Human Capital (HC)* is proxied by percentage of relevant group participating in higher secondary education. Higher secondary education completes the provision of secondary education that begins after the completion of secondary level, and aims at laying the foundation for lifelong learning and human development, by offering more subject- or skill-oriented instruction by more specialised teachers. Human capital enhances the productivity of physical capital and labour. The accumulation of human capital has both internal effects (the effects of an individual's human capital on her own productivity) and external effects (the contribution to the productivity of all factors of production by the average level of skill or human capital) (Lucas, 1990).

*Gross domestic investment (GDI)* consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. It is coded as percentage of GDP.

*Government’s expenditure (GE)* denotes Central government’s development expenditure, also indicated by percentage of GDP.

*Gross fixed capital formation (GFCF)*: Investment is made on the GFC. So, we observe the contribution of GFCF to economic growth with other variable. (Saving has not been considered because S ≠ I, some portion has been invested and other portion consume).

*Credit/GDP (DCR)* has been defined as domestic credit provided by the banking sector divided by GDP. Domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government, which is net. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data is available (including institutions that do not accept transferable deposits but do incur such liabilities as time and savings deposits). Examples of other banking institutions are savings and mortgage loan institutions and building and loan associations.

To capture the effect of good governance in affecting the FDI a dummy variable is used. Dummy variable (DM) [D=1 for democratic government, D = 0 for otherwise]. Good governance is proxied by democratic government.
4.3 Methodology and model specification

The conventional approach to investigate the relationship between growth and FDI involves regressions for the rate of output growth on the rate of FDI growth. Often, additional explanatory variables (for example, the rate of growth of the domestic capital stock, domestic labour force growth) are included in order to control for other influences upon the rate of economic growth. Such models are often presented in terms of a production function-type of framework that treats FDI (foreign capital) as a factor input.

The empirical growth literature has identified a number of variables that are typically correlated with economic growth [Lensik and Morissey (2001), Barro (1996), Borensztein et. al., (1998), Shahoo (2006), Iqbal (2006), and Carkovic and Levine (2002)]. In the light of the discussion in the literature review section and variables definition section, the following is the functional form of the basic model:

\[
\text{GDP per capita Growth} = f ([\text{FDI}, \text{ExpoImp}, \text{Govt.DevExp}, \text{DomsInv}, \text{GFCF}, \text{HumCap}, \text{DCR}, \text{good Governance (democratic government)}])
\]

The regression equation specified to measure the effects of FDI on economic growth is as follows:

\[
g = \alpha_0 + \beta_1 (Y_o) + \beta_2 (\text{FDI}) + \beta_3 (\text{XM}) + \beta_4 (\text{GE}) + \beta_5 (\text{HC}) + \beta_6 (\text{GFCF}) + \beta_7 (\text{DI}) + \beta_8 (\text{DCR}) + \beta_9 (\text{FDI*XM}) + \beta_{10} (\text{FDI*DI}) + D_{m} + \epsilon
\]

where

- \( g \) = per capita GDP growth rate,
- \( Y_o \) = initial per capita GDP (GDP_{t-1}),
- FDI = net foreign direct investment inflows as percentage of GDP,
- XM = trade openness (the sum of total export and import as percentage of GDP),
- GE = Government development expenditure as ratio of GDP,
- HC = human capital,
- GFCF = gross fixed capital formation to the share of GDP,
- DI = Gross domestic investment is coded as percentage of GDP,
- CR = ratio of private domestic credit to real GDP,
- FDI*XM = interaction of FDI with trade,
- FDI*DI = interaction of FDI with domestic investment,
- FDI*HC = interaction of FDI with Human capital,
- \( D_m \) = Dummy variable and
- \( \epsilon \) = error term.

We expect positive relationships between the dependent variable and all explanatory variables. If the model specification is reasonable, the estimated coefficient of FDI will indicate the direction and magnitude of the impact of FDI on economic performance. Appropriate statistical tools will be used for the presentation, interpretation.
and analysis of collected data. Granger causality tests have been applied to see if there exists unidirectional or bi-directional causality among the variables of concern.

While equation (1) captures the impact of most of the important variables, it does not account for the possibility of bidirectional relationship between growth and FDI highlighted in the recent literature. To capture these possible temporal causality relationships, the technique of Granger-causality are employed (Granger, 1969, 1980).

5.0 Empirical Results

5.1 Bivariate regression results

This section includes a series of regressions to underscore the many advantages and growth prospects that FDI inflows have brought to Bangladesh and India. The methodology of the empirics constitutes a series of regressions using the Ordinary Least Squares (OLS) model to prove a significant correlation between FDI and economic growth. The data used in the analysis will begin from 1974 when FDI had just begun to flow into the nation after the era of reconstruction and war recovery. The tables express the coefficients and t-statistics of each independent x-variable to demonstrate its level of significance. The R-squared or coefficient of determination is included to represent how much variation in the dependent y-variable is captured by the regression. To find out the individual influence of FDI on GDP and other variables firstly we have considered several bivariate regression analysis for Bangladesh and India in Table 1 and 2.

The bivariate regression results of the economic growth for Bangladesh based on FDI is presented in Table 1. Firstly, dependence of the growth of GDP on FDI is found out. Secondly, dependence of other variables on FDI is found out individually.

Table 1: Bivariate Regression Results for Bangladesh

<table>
<thead>
<tr>
<th>Case of Bangladesh</th>
<th>Independent Variable: Foreign Direct Investment (FDI)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variables</td>
<td>GDP (mn$)</td>
<td>GDP gr</td>
<td>GDP pc (US$)</td>
<td>GDP pcGr</td>
<td></td>
</tr>
<tr>
<td>Constant coefficient</td>
<td>2750</td>
<td>3.96</td>
<td>2.67</td>
<td>1.57</td>
<td></td>
</tr>
<tr>
<td>Co-efficient</td>
<td>63.285 (8.15)**</td>
<td>3.314 (1.77)*</td>
<td>0.305 (9.76)***</td>
<td>3.903 (2.14)**</td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.668</td>
<td>0.92</td>
<td>0.754</td>
<td>0.0128</td>
<td></td>
</tr>
<tr>
<td>Standard Error (Se)</td>
<td>7.769</td>
<td>1.872</td>
<td>0.0313</td>
<td>1.828</td>
<td></td>
</tr>
<tr>
<td>R²-Adjusted</td>
<td>0.658</td>
<td>0.063</td>
<td>0.746</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>Df</td>
<td>34</td>
<td>32</td>
<td>32</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

Absolute value of t-statistics in parentheses.
* Significant at 10%; ** Significant at 5%; *** Significant at 1%.
Regression (1) shows that a $1 million increase in FDI inflows raises GDP by US$ 63.29 million. Although the coefficient is subject to standard error 7.769, it is statistically significant at 1% level. Regression (2) examines the influence of FDI inflows (as percentage of GDP) on the annual percentage growth of GDP. It suggests that a unit increase in FDI results in a 3.31 increase in GDP growth in Bangladesh. Regression (3) shows that a $1 million increase in FDI inflows raises GDP per capita by US$ 0.305. Although the coefficient is subject to standard error 0.0313, it is statistically significant at 1% level. The result reveals very little influence of FDI on the GDP per capita of Bangladesh. Regression (4) examines the relationship between FDI inflows (as a percent of GDP) and the annual growth in GDP per capita, which is arguably a better indicator for economic growth since it deals with the percentage change rather than the absolute value. Regression (4) has been included as a benchmark to demonstrate the positive correlation between GDP per capita growth and FDI inflows. It suggests that a unit increase in FDI inflows (percentage of GDP) induces a 3.903 increase in GDP per capita growth.

Table 2: Bivariate Regression Results for India

<table>
<thead>
<tr>
<th>Case of INDIA</th>
<th>(1.1)</th>
<th>(1.2)</th>
<th>(1.3)</th>
<th>(1.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variables</td>
<td>GDP (mn$)</td>
<td>GDP gr</td>
<td>GDP pc (US$)</td>
<td>GDP pcGr</td>
</tr>
<tr>
<td>Constant coefficient</td>
<td>2164</td>
<td>4.70</td>
<td>278</td>
<td>2.60</td>
</tr>
<tr>
<td>Co-efficient</td>
<td>42.31</td>
<td>1.881</td>
<td>0.030</td>
<td>2.642</td>
</tr>
<tr>
<td>**</td>
<td>(9.64)***</td>
<td>(1.67)*</td>
<td>(9.82)***</td>
<td>(2.34)**</td>
</tr>
<tr>
<td>R²</td>
<td>73.8%</td>
<td>8.2%</td>
<td>75.7%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Standard Error (Se)</td>
<td>4.389</td>
<td>1.128</td>
<td>0.003</td>
<td>1.131</td>
</tr>
<tr>
<td>R²-Adjusted</td>
<td>73.0%</td>
<td>5.3%</td>
<td>74.9%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Df</td>
<td>34</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

Absolute value of t-statistics in parentheses.
*Significant at 10%; ** Significant at 5%; *** Significant at 1%.

From Table 2, regression (1.1) shows that a $1 million increase in FDI inflows raises GDP by US$ 42.312 million. Although the coefficient is subject to standard error 4.389, it is statistically significant at 1% level. Regression (1.2) examines the influence of FDI inflows (as percentage of GDP) on the annual percentage of GDP growth. This regression acts as bench mark to illustrate the positive relation between the two; it suggests that a unit increase in FDI results in a 1.88 unit increase in GDP growth. Regression (1.3) shows that a $1 million increase in FDI inflows raises GDP per capita
FDI and Economic Growth: An Empirical Investigation of India and Bangladesh

by US$ 0.0304. Although the coefficient is subject to standard error 0.003099 it is statistically significant at 1% level. The result reveals very little influence of FDI on the GDP per capita of India also. Regression (1.4) examines the relationship between FDI inflows (as a percent of GDP) and the annual growth in GDP per capita, which is arguably a better indicator for economic growth since it deals with the percentage change rather than the absolute value. Regression (4) has been included as a benchmark to demonstrate the positive correlation between GDP per capita growth and FDI inflows. It suggests that a unit increase in FDI inflows (percentage of GDP) induces a 2.642 increase in GDP per capita growth in India.

Table 1 shows a good influence of FDI inflows on GDP growth rate of Bangladesh. The regression result specifies that there is no change in the independent variable, the GDP growth rate of Bangladesh remains 3.96 percent with standard error 1.872. The $R^2$ is good at 0.92. The bivariate regression results of the economic growth of India based on FDI is presented in Table 2. Similarly, India also shows little influence of FDI on its GDP growth rate. Table 2 also reveals that there is no change in the independent variable, the GDP growth in India would remain 4.70 percent with standard error of 0.112; the $R^2$ is 0.082. From the both table it is clear that per capita GDP growth of Bangladesh is more influenced by the one unit change of FDI than that of India.

Other variables such as domestic savings, domestic investment, government expenditure, export, import, value added in various sectors show significant constants which present less influence of FDI inflows on their growth for the both countries (Table 1 and 2).

In general way, without testing any statistical significance, the above discussion reveals that FDI inflows influence the growth of GDP and also per capita GDP growth. Its impact is relatively higher in Bangladesh than India. But we are getting apparently a good relation between FDI/GDP growths by a two variable regression. But when we are introducing more independent variables in the regression the coefficient of FDI are reducing significantly and the test are not giving any statistically significant result.

However, we have used time series data for the study. All macroeconomic time series data show some trend. When working with the time series data, the first issue is whether the series are stationary or not. Without following the standard methods for testing the statistical significance of the variables or estimator the resulting outcome will be of no practical use. We now present the econometric analysis.

5.2 Impact of FDI on economic growth in Bangladesh

Our objective of the study is to find out the relationship between FDI and economic growth for Bangladesh or India. The interest is to show the impact of FDI on
economic growth, and GDP growth which is taken as a general measure of economic growth of an economy.

We first test for inter-correlations among the regressors (Table 3). A glance at these results suggest that there are multicollinearity problems. All variables are statistically insignificant, a classical symptom of multicollinearity. The correlation matrix indicates that we can use only GDPG, FDI, GFCF as our key variables because others share multicollinearity. As we want to see the rate of change of these variables we used log linear function.

Table 3: Correlation Matrix (Bangladesh)

<table>
<thead>
<tr>
<th>Variables</th>
<th>GDPG</th>
<th>FDI</th>
<th>XM</th>
<th>GE</th>
<th>HC</th>
<th>GFCF</th>
<th>DI</th>
<th>SR</th>
<th>DCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPG</td>
<td>1</td>
<td>0.3</td>
<td>0.39</td>
<td>-0.02</td>
<td>0.3</td>
<td>0.33</td>
<td>0.35</td>
<td>0.29</td>
<td>0.38</td>
</tr>
<tr>
<td>FDI</td>
<td>0.3</td>
<td>1</td>
<td>0.74</td>
<td>0.11</td>
<td>0.57</td>
<td>0.61</td>
<td>0.61</td>
<td>0.61</td>
<td>0.66</td>
</tr>
<tr>
<td>XM</td>
<td>0.39</td>
<td>0.74</td>
<td>1</td>
<td>0.31</td>
<td>0.77</td>
<td>0.8</td>
<td>0.85</td>
<td>0.77</td>
<td>0.84</td>
</tr>
<tr>
<td>GE</td>
<td>-0.02</td>
<td>0.11</td>
<td>0.31</td>
<td>1</td>
<td>0.37</td>
<td>0.57</td>
<td>0.53</td>
<td>0.39</td>
<td>0.35</td>
</tr>
<tr>
<td>HC</td>
<td>0.3</td>
<td>0.57</td>
<td>0.77</td>
<td>0.37</td>
<td>1</td>
<td>0.88</td>
<td>0.9</td>
<td>0.92</td>
<td>0.87</td>
</tr>
<tr>
<td>GFCF</td>
<td>0.33</td>
<td>0.61</td>
<td>0.82</td>
<td>0.57</td>
<td>0.88</td>
<td>1</td>
<td>0.97</td>
<td>0.94</td>
<td>0.92</td>
</tr>
<tr>
<td>DI</td>
<td>0.35</td>
<td>0.61</td>
<td>0.85</td>
<td>0.53</td>
<td>0.9</td>
<td>0.97</td>
<td>1</td>
<td>0.93</td>
<td>0.9</td>
</tr>
<tr>
<td>SR</td>
<td>0.29</td>
<td>0.61</td>
<td>0.77</td>
<td>0.39</td>
<td>0.92</td>
<td>0.94</td>
<td>0.93</td>
<td>1</td>
<td>0.93</td>
</tr>
<tr>
<td>DCR</td>
<td>0.38</td>
<td>0.66</td>
<td>0.84</td>
<td>0.35</td>
<td>0.87</td>
<td>0.92</td>
<td>0.9</td>
<td>0.939</td>
<td>1</td>
</tr>
</tbody>
</table>

The empirical model is estimated by OLS method. However, before estimation it is imperative to check the time series properties of the underlying data. All macroeconomic time series data show some trend. When working with the time series data, the first issue is whether the series are stationary or not. A stochastic process is said to be stationary if its mean and variance are constant over time and the covariance between the two time periods depends only on the distance between the two time periods and not the actual time at which the covariance is computed. If the variables are not integrated to the same order, then the regression may be spurious one and the resulting outcome will be of no practical use. To avoid this problem, before estimating the model, unit root test is carried out. To test the stationarity of the variables we conducted the Augmented Dickey-Fuller test for all variables. The criterion is if the absolute value of the test statistics of the Augmented Dickey-Fuller test is higher than the critical absolute value, the null hypothesis is rejected. It means that there is no unit root in the series and
the variables are stationary. Conversely if the absolute value of the test statistic is less than the critical absolute value, the null hypothesis is not rejected. Using eviews software package the results of the Augmented Dickey-Fuller test for variables in case of Bangladesh are presented in Table 4.

**Table 4: ADF Unit Root Test Results (Bangladesh)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level Without Trend</th>
<th>Level With Trend</th>
<th>First difference Without Trend</th>
<th>First difference With Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>LnGDPG</td>
<td>1.512</td>
<td>-1.173</td>
<td>-8.374*</td>
<td>-11.62*</td>
</tr>
<tr>
<td>LnFDI</td>
<td>-0.094</td>
<td>-4.033*</td>
<td>-7.011*</td>
<td>-7.390*</td>
</tr>
<tr>
<td>LnGFCF</td>
<td>-0.758</td>
<td>-2.786</td>
<td>-6.760*</td>
<td>-7.507*</td>
</tr>
<tr>
<td>Dm</td>
<td>-0.969</td>
<td>-2.00</td>
<td>-5.656*</td>
<td>-5.561*</td>
</tr>
</tbody>
</table>

Note:
1. Critical values for 1%, 5% and 10% significance levels are -2.6369, -1.9513 and -1.6107 respectively.
2. Critical values for 1%, 5% and 10% significance levels are -3.7700, -3.1900 and -2.8900 respectively.

*, **, and *** indicate significance at 1%, 5% and 10% levels respectively.

From Table 4 it is found that all variables contain unit root. To make the variables stationary the first difference of all variables were taken and it was found that the variables were integrated of order one i.e. I (1). The results show that LnGDPG, LnFDI, Loggfcf are non-stationary at level at 1%, 5%, and 10% significance level, but the first differences of these variables are stationary. However, LnFDI is trend stationary at its level.

The regression results for Bangladesh are given in Table 5. It can be seen from table 5 that except LNFDI, all other variables have statistically significant impact, with expected signs, on GDP growth. The highest impact comes from GFCF, which is quite obvious. The sign of LNFDI coefficient is positive but it is statistically insignificant. The result indicates that FDI is positively correlated to the economic growth of Bangladesh but it has not yet been established as a significant determining factor for the economic growth of Bangladesh.

The coefficient of capital formation (GFCF) is significant at the 1% level and the sign is positive indicating that 1% increase in gross fixed capital will increase the growth rate of GDP by 13.266%. This means that capital formation has positive influence on economic growth in Bangladesh. The coefficient of dummy variable is positive and statistically significant. This implies that democratic governments have been contributing to the economic growth of Bangladesh. The reason may be democratic
governments make effective policies and build good institutions which ultimately lead to economic growth.

### Table 5: Regression Results (Bangladesh)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>6.320</td>
<td>0.266</td>
<td>23.69</td>
<td>0.00</td>
</tr>
<tr>
<td>LNFDI</td>
<td>0.003</td>
<td>0.003</td>
<td>0.897</td>
<td>0.37</td>
</tr>
<tr>
<td>LNGFCF</td>
<td>0.451</td>
<td>0.034</td>
<td>13.26</td>
<td>0.00</td>
</tr>
<tr>
<td>DM</td>
<td>0.151</td>
<td>0.050</td>
<td>2.980</td>
<td>0.00</td>
</tr>
</tbody>
</table>

R-squared-0.962, Adjusted R-squared-0.958, S.E. of regression-0.084, F-statistic-257.4, Prob(F-statistic)- 0.00

Durbin-Watson stat-0.670, Akaike info criterion--2.00, Schwarz criterion- (-1.82)

The R^2 and adjusted R^2 values indicate that the behaviour of FDI in Bangladesh is almost completely explained by the independent variables included in the model. F statistic shows that the independent variables are jointly highly significant. The coefficient of determination (R^2 = 0.96) is quite high and reveals almost a perfect fit of the model. This indicates the proportion of total variation in GDP growth explained by the explanatory variables.

Thus, on the basis of the above regression results, we get the following estimating equation.

\[
\text{LNGDP}_t = 6.320 + 0.003\times\text{LNFDI} + 0.451\times\text{LNGFCF} + 0.151\times\text{DM}
\]

### 5.3 Impact of FDI on economic growth in India

As in the previous case, we first test for correlation among the regressors (Table 6). We observe multicollinearity among the variables which will affect our regression results. The correlation matrix indicates that we can use only GDPG, FDI, GFCF, SR and DCR as our key variables because of multicollinearity. As we want to see the rate of change of these variables we used log linear function. We are not considering the savings ratio in our study and here we have found that the DCR is not stationary in any level. So, we have excluded the DCR from our analysis. Using Eviews software package the results of the Augmented Dickey-Fuller test are presented in Table 7. From Table 7, it can be seen that all variables contain unit root. To make the variables stationary the first difference of all variables was taken and the variables were found to be integrated of order one i.e. I (1). The results show that LnGDPG, LnFDI, LnGFCF are level non-
stationary at 1%, 5%, and 10% levels, but first difference stationary. However, LogFDI is trend stationary at its level.

Table 6: Correlation Matrix (India)

<table>
<thead>
<tr>
<th></th>
<th>GDPPG</th>
<th>GDPGR</th>
<th>FDI</th>
<th>XM</th>
<th>GE</th>
<th>HC</th>
<th>GFCF</th>
<th>DI</th>
<th>SR</th>
<th>DCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDPPG</td>
<td>1.000</td>
<td>0.99</td>
<td>0.38</td>
<td>0.48</td>
<td>-0.31</td>
<td>0.50</td>
<td>0.44</td>
<td>0.42</td>
<td>0.31</td>
<td>0.43</td>
</tr>
<tr>
<td>GDPGR</td>
<td>0.99</td>
<td>1.000</td>
<td>0.29</td>
<td>0.38</td>
<td>-0.25</td>
<td>0.40</td>
<td>0.35</td>
<td>0.30</td>
<td>0.25</td>
<td>0.36</td>
</tr>
<tr>
<td>FDI</td>
<td>0.38</td>
<td>0.29</td>
<td>1.000</td>
<td>0.88</td>
<td>-0.50</td>
<td>0.82</td>
<td>0.66</td>
<td>0.73</td>
<td>0.45</td>
<td>0.51</td>
</tr>
<tr>
<td>XM</td>
<td>0.48</td>
<td>0.38</td>
<td>0.88</td>
<td>1.000</td>
<td>-0.54</td>
<td>0.91</td>
<td>0.78</td>
<td>0.77</td>
<td>0.5</td>
<td>0.63</td>
</tr>
<tr>
<td>GE</td>
<td>-0.31</td>
<td>-0.25</td>
<td>-0.50</td>
<td>-0.54</td>
<td>1.000</td>
<td>-0.67</td>
<td>0.75</td>
<td>-0.75</td>
<td>-0.62</td>
<td>-0.75</td>
</tr>
<tr>
<td>HC</td>
<td>0.50</td>
<td>0.40</td>
<td>0.82</td>
<td>0.91</td>
<td>-0.67</td>
<td>1.000</td>
<td>0.90</td>
<td>1.03</td>
<td>0.84</td>
<td>0.87</td>
</tr>
<tr>
<td>GFCF</td>
<td>0.44</td>
<td>0.35</td>
<td>0.66</td>
<td>0.78</td>
<td>-0.75</td>
<td>0.90</td>
<td>1.000</td>
<td>0.75</td>
<td>0.77</td>
<td>0.78</td>
</tr>
<tr>
<td>DI</td>
<td>0.42</td>
<td>0.35</td>
<td>0.73</td>
<td>0.77</td>
<td>-0.75</td>
<td>0.84</td>
<td>0.93</td>
<td>1.000</td>
<td>0.77</td>
<td>0.78</td>
</tr>
<tr>
<td>SR</td>
<td>0.31</td>
<td>0.25</td>
<td>0.45</td>
<td>0.52</td>
<td>-0.62</td>
<td>0.70</td>
<td>0.84</td>
<td>0.77</td>
<td>1.000</td>
<td>0.72</td>
</tr>
<tr>
<td>DCR</td>
<td>0.43</td>
<td>0.36</td>
<td>0.5</td>
<td>0.63</td>
<td>-0.70</td>
<td>0.82</td>
<td>0.87</td>
<td>0.78</td>
<td>0.72</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Table 7: ADF Unit Root Test Results (India)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Level</th>
<th>First difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Trend</td>
<td>With trend</td>
</tr>
<tr>
<td>LnGDPG</td>
<td>1.994</td>
<td>-1.499</td>
</tr>
<tr>
<td>LnFDI</td>
<td>-1.063</td>
<td>-3.846**</td>
</tr>
<tr>
<td>LnGFCF</td>
<td>0.674</td>
<td>-2.263</td>
</tr>
<tr>
<td>Dm</td>
<td>-1.098</td>
<td>-1.849</td>
</tr>
</tbody>
</table>

Note:
1. Critical values for 1%, 5% and 10% significance levels are -2.6369, -1.9513 and -1.6107 respectively.
2. Critical values for 1%, 5% and 10% significance levels are -3.7700, -3.1900 and -2.8900 respectively.

The regression results for India are given in Table 8. It is seen that the highest impact comes from GFCF, which is quite obvious. The sign of LNFDI coefficient is negative and it is statistically insignificant also. The result indicates that FDI is negatively correlated to the economic growth of India and it has not yet been established as a significant determining factor for the economic growth of India till now.

The estimated coefficient for FDI is negative and statistically insignificant. When the coefficient is insignificant, no inference can be drawn from the result under the used data set and the model. It cannot be said that FDI has a positive or negative impact on economic growth for India. The result is ambiguous for India. The result of this
analysis is consistent with the findings of Datta (1997), Agosin and Ricardo (2000), Carcovic and Levine (2002), Alam (1999) and Pradhan (2003). However, Alam carried out comparative study between India and Bangladesh. He asserted that FDI inflows to India have lack of infrastructural facilities, resource constraints and lack of entrepreneurial knowledge. This shows that the country has not been getting benefit from FDI which will create more conducive environment for enhancing the economic growth. On the other hand, the estimated coefficient of GFCF is positive and highly significant. The coefficient of capital formation (GFCF) is significant at the 1% level and the sign is positive indicating that 1% increase in gross fixed capital will increase the growth rate of GDP by 12.86%. This means that GFCF has highly significant positive impact on GDP growth as expected. The other variable, dummy variable, has very small positive influence on GDP growth but not statistically significant. This result reveals that all types of government in India have been contributing to the economic growth.

<table>
<thead>
<tr>
<th>Dependent Variable: LOG(GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>LOG(FDI)</td>
</tr>
<tr>
<td>LOG(GFCF)</td>
</tr>
<tr>
<td>DM</td>
</tr>
</tbody>
</table>

R-squared-0.961, Adjusted R-squared-0.957, S.E. of regression- 0.126, F-statistic- 238.9, Prob(F-statistic)- 0.000
Durbin-Watson stat-0.646, Akaike info criterion--1.182, Schwarz criterion--1.000

On the other hand, the estimated coefficient of GFCF is positive and highly statistically significant. The coefficient of capital formation (GFCF) is significant at the 1% level and the sign is positive indicating that 1% increase in gross fixed capital will increase the growth rate of GDP by 12.86%. This means that GFCF has highly significant positive impact on GDP growth as expected. The other variable, dummy variable, has very small positive influence on GDP growth but not statistically significant. This result reveals that all types of government in India have been contributing to the economic growth.

The $R^2$ and adjusted $R^2$ indicate that the behaviour of foreign direct investment in case of India is almost completely explained by the independent variables included in the model. F statistic shows that the independent variables are jointly highly significant.
The coefficient of determination (R^2 = 0.96) is quite high and reveals almost a perfect fit of the model. This indicates the proportion of total variation in GDP growth explained by the explanatory variables. Thus, on the basis of the above regression results, we get the following estimating equation.

\[
\text{LNGDP}_t = -3.252 - 0.041*\text{LNFDI} + 1.024*\text{LNGFCF} + 0.0273*\text{DM}
\]

FDI inflows to India has been increasing dramatically during the recent periods. India has opened up her economy since two decades and various reforms have been undertaken since then. It has a large area of locked land and also the world’s second largest population. However, due to lack of infrastructural facilities, resource constraints and lack of entrepreneurial know-how, the country has not been getting benefit from FDI which will create more conducive environment for enhancing the economic growth.

One of the significant observations that this study derived is that the growth effect of GFCF is highly significant than FDI to the level of GDP growth both in Bangladesh and India. It is true that capital formation has a positive influence on economic growth. Government can give more concentration to build more fixed capital formation as a level playing field for economic growth. The study found that the government has a significant role to promote the economy of a country.

### 5.4 Granger causality test between FDI and economic growth

The Granger-causality test is used to ascertain the direction of causality between GDPGR and FDI. This test assumes that the underlying time series are stationary, i.e., I(0) processes. Therefore, it is imperative to examine whether GDPGR and FDI are stationary. Augmented Dickey-Fuller (ADF) test is employed to check the stationary property of these two variables. One of the implications of Granger- causality test is that if two variables, say X, and Y, are cointegrated and each is individually I(1), that is, integrated of order one, then either X, must Granger-cause Y, or Y, must Granger-cause X. Therefore, it is necessary to ascertain whether two variables X, and Y, are cointegrated, that is, whether there is any long-run relationship between these two variables.

The casual relationship between GDPGR and FDI is examined by standard Granger-causality test. Following equations are estimated for this purpose:

\[
\text{GDPGR}_t = \sum_{i=1}^{n} a_i \text{GDPGR}_{t-i} + \sum_{j=1}^{m} b_j \text{FDI}_{t-j} + u_t \tag{1}
\]
The rejection of null hypothesis that FDI does not Granger-cause GDPGR requires that (a) estimated coefficients on the lagged FDI in (1) are statistically different from zero (i.e., $\sum bj \neq 0$) and (b) the set of estimated coefficient on the lagged GDPGR in (2) is not statistically different from zero (i.e., $\sum cj \neq 0$). Similarly, rejection of null hypothesis that GDPGR does not Granger-cause FDI requires that (a) the estimated coefficients on the lagged FDI in (1) are not statistically different from zero (i.e., $\sum bj \neq 0$) and the set of estimated coefficient on the lagged GDPGR in (2) is not statistically different from zero (i.e., $\sum cj \neq 0$).

As Granger- causality test is very sensitive to the number of lags used in estimation procedure, optimum lag length is determined by applying Schwarz Criterion (SC). According to this criterion optimum lag length $m$ is obtained by minimizing the function.

$$SC = \ln \hat{a}^2 + m \ln n$$

where, $\hat{a}^2$ is the maximum likelihood estimate of $a2$ (RSS/n).

The results of Granger-causality tests for Bangladesh and India are reported in Tables 9 and 10 respectively. The Schwartz Information Criterion (SC) has been used to determine the optimal lag length in the test.

**Table 9: Granger-Causality Test (for Bangladesh)**

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>m</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNFDI does not Granger Cause LNGDP</td>
<td>2</td>
<td>0.333</td>
<td>0.719</td>
</tr>
<tr>
<td>LNGDP does not Granger Cause LNFDI</td>
<td>2</td>
<td>5.577</td>
<td>0.009*</td>
</tr>
</tbody>
</table>

Notes: *indicates that the t values are significant at 1 percent level; Optimum lag lengths (m) are determined by minimising the Akaike Information criteria (AIC) by E-views package.

**Table-10: Granger-Causality Test (for India)**

<table>
<thead>
<tr>
<th>Null Hypothesis</th>
<th>m</th>
<th>F-Statistic</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDI does not Granger Cause GDP</td>
<td>2</td>
<td>2.349</td>
<td>0.114</td>
</tr>
<tr>
<td>GDP does not Granger Cause FDI</td>
<td>2</td>
<td>4.521</td>
<td>0.020*</td>
</tr>
</tbody>
</table>

Notes: * indicates the t values are significant at 1 percent level; Optimum lag lengths (m) are determined by minimising the Akaike Information criteria (AIC) by E-views package.
The results reported in Table 9 show that null hypothesis that FDI does not Granger-cause GDPGR is not rejected because the F statistics yields a value of 0.33376 which is below the critical value of F0.01 = 5.53. Thus, we cannot reject the null hypothesis (bj = 0). This signals that FDI does not Granger causes growth in Bangladesh. On the other hand the next portion of the results in the table indicates that GDP growth Granger causes FDI in Bangladesh (F statistics 5.5776, which exceeds the critical value of F0.01 = 5.53). The result also confirms that there is no bi-directional causality (feedback) between GDPGR and FDI. That is, Causality test indicates that there is a unidirectional causality from GDP to FDI in case of Bangladesh. So, the conclusion is that, in Bangladesh, there is a long-run equilibrium relationship between economic growth and FDI and economic growth Granger-causes FDI.

Similar results are observed in case of India also. The results reported in Table 10 show that null hypothesis that FDI does not Granger-cause GDPGR is not rejected because the F statistics yields a value of 0.33376 which is below the critical value of F0.01 = 5.53. Thus, we cannot reject the null hypothesis (bj = 0). This signals that FDI does not Granger causes growth in India. On the other hand the next portion of the results in the table indicates that GDP growth Granger causes FDI in India. The result also confirms that there is no bi-directional causality between GDPGR and FDI.

That is, Causality test indicates that for both countries there is a unidirectional causality from GDP to FDI. So, the conclusion is that there is a long-run equilibrium relationship between economic growth and FDI and economic growth Granger-causes FDI for both Bangladesh and India.

6.0 Conclusions

The main objective of our study is to analyse the relationship between FDI and economic growth in Bangladesh and India. From the analysis of simple regression it is evident that there is a strong positive correlation between FDI and growth of GDP or growth of GDP per capita. However, when we examine the impact of FDI on economic growth using multiple regression with time series data, we get ambiguous results. The above empirical exercise does not find any significant role for FDI in the economic growth of Bangladesh. The FDI inflows into Bangladesh are very low compared to other neighbour South Asian Countries. It is found that, FDI is positively correlated to the economic growth of Bangladesh but it has not yet been established as a significant determining factor for the economic growth of Bangladesh. The estimated coefficient for FDI is positive but statistically insignificant. When the coefficient is insignificant, no
inference can be drawn from the result under the used data set and the model. It cannot be said that FDI has a positive or negative impact on economic growth of Bangladesh.

On the other hand, FDI is negatively correlated to the economic growth of India and it has not yet been established as a significant determining factor for the economic growth of India till now. When the coefficient is insignificant, no inference can be drawn from the result under the used data set and the model. Hence, the result is ambiguous for India as well.

Thus, since we are not able FDI as a significant determining factor for the economic growth of India and Bangladesh, the FDI policy should be formulated in such a way that attracts more foreign potential investors and NRIs to invest in the country in those sectors which create employment and income in a larger scale. Both the countries need more FDI into the priority sectors, so that they can get immediate yields from the investment. Investment in infrastructures and export-led manufacturing sectors can contribute more to economic growth and FDI is imperative in this case.

References


