BIISS JOURNAL, VOL. 28, NO. 2, APRIL 2007: 101-119

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IS FOREIGN DIRECT INVESTMENT GROWTH-ENHANCING IN BANGLADESH?

Abstract

The recent debate over the foreign direct investment (FDI)-economic growth nexus has generated sizeable theoretical and empirical investigation both for developed and developing countries. This study explores the nexus in the context of a South Asian less developed country, Bangladesh, using long run time series data from 1972 to 2005. The study finds that FDI can explain the variation in GDP, but the relationship between FDI and growth is Granger-neutral, *i.e.*, FDI does not cause economic growth. Various time series tests have been performed on the dataset, which show that the series FDI is stationary or random but GDP is not, and the variables are not cointegrated, which means there is no long-term relationship between the two variables.

Keywords: FDI, Economic growth, Causality, Stationarity, Cointegration.

1. Introduction

The recent debate over the impact of foreign direct investment (FDI) on economic growth has received a wide range of theoretical and empirical interest. The surge of FDI in developing economies during the last one and half decades is significant in terms of

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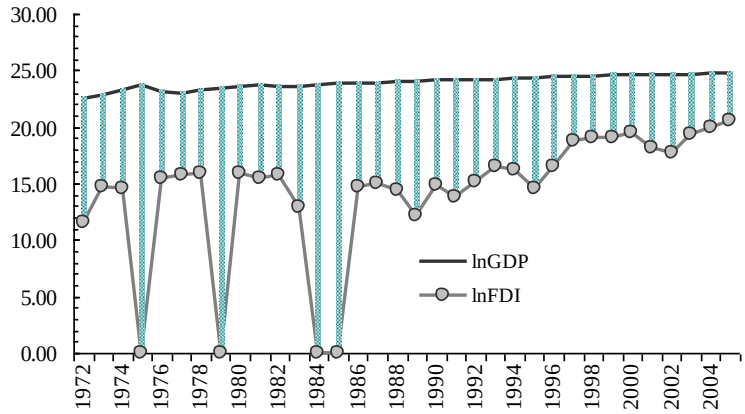
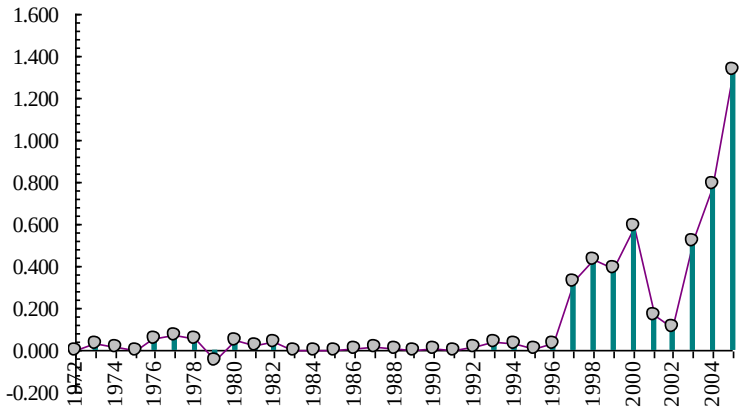
declining dependence on foreign aid, a more flexible policy regime conducive to attracting an increased quantity of FDI, and the overwhelming visibility of foreign firms in the domestic markets and their share of export earning of the host countries. A number of studies have been conducted on the topic in various countries and regions with mixed results. A recent analysis using long-term data from developing countries also demonstrated, to some degree, the significant impact of foreign investment on economic growth.[1]

South Asia is home to almost one-fifth of the world population, about half of whom live in abject poverty. In order to achieve the heavily promoted Millennium Development Goals (MDGs) of poverty alleviation and social development, they need accelerated economic growth. The nations in the region are trying their best to gear up the pace of economic growth through a range of policy measures. In hosting FDIs as one of most active economic instruments, the result has been an increased flow of foreign investment in the region.

Figure 1: Ratio comparison between net FDI and GDP (top) and net FDI as percentage of GDP (bottom) in Bangladesh



[1] N. Kumar, and J. P. Pradhan, "Foreign Direct Investment, Externalities and Economic Growth in Developing Countries: Some Empirical Explorations and Implications for WTO Negotiations on Investment", *Discussion Paper # 27/2002*, Research and Information System, New Delhi.



Bangladesh seems to offer perhaps the most attractive and liberal FDI regime in South Asia. The country has adopted a number of congenial policies and provided liberal incentives to attract FDI inflow. FDI is allowed in every sector of the economy except five sensitive industries reserved for the public sector[2]. Foreign investment is entitled to receive a number of special treatments. They have the advantage of tax holiday for five to seven years since the month of production. Private sector power companies enjoy income tax exemption for fifteen years from the period of commercial production. Foreign enterprises and experts get tax exemption on their royalties and technical fees. For tax paying foreign enterprises there are bilateral arrangements with major trading partners to protect double taxation. Hundred per cent export-oriented firms do not have to pay any duty for importing machinery and spare parts. Full repatriation of profit and dividend by the foreign companies are permitted and at the same time re-investment of repatriable dividend is treated to be new investment. Foreign investors or companies are free to apply for full working capital loans from the local banks.[3] Despite all these attractive terms, the net inflow of FDI is still meagre (less than 1.5 per cent of GDP in 2005) and it has not been

[2] The industries are defence equipments, nuclear energy, forest plantation, security printing, and railways.

[3] See, for details, BEPZA Act 1980, Foreign Investment Act 1980, Companies Act 1994, and Industrial Policy 2004 of Bangladesh.

found to be growth-enhancing in Bangladesh in a recent study.[4] Now, the important question is, if foreign investment does not have any significant influence on the economic growth of the country, why should Bangladesh welcome multi-billion dollar FDIs which would in fact be exploiting the country's scarce natural resources and receive special and differential treatment? It is in such a context that the present paper tries to investigate the nexus between FDI and economic growth in Bangladesh to help make appropriate policy decisions.

2. A Review of Literature

A growing body of literature suggests that FDI has a statistically significant strong positive impact on economic growth in host economies.[5] Chen *et al* found a significantly positive relationship between FDI and economic growth in post-1978 China.[6] de Mello,

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[4] Kumar and Pradhan , 2002, *op cit.*

[5] For example, see, L. Alfaro, A. Chanda, S. Kalemli and S. Sayek, "FDI and Economic Growth: The Role of Local Financial Markets", *Journal of International Economics*, 64 (1), 2004, pp. 113-134; E. Borensztein, J. de Gregorio and J-W. Lee, "How does Foreign Direct Investment affect Economic Growth?" *Journal of International Economics*, 45, 1998, pp. 115-135; J. Benhabib and M. M. Spiegel, "The Role of Human Capital in Economic Development: Evidence from Aggregate Cross-Country Data", *Journal of Monetary Economics*, 34, 1994, pp. 143-173; L. de Mello, "Foreign Direct Investment-led Growth: Evidence from Time Series and Panel Data", *Oxford Economic Papers*, 51, 1999, pp. 133-151; V.N. Balasubramanyam, M. Salisu and D. Sapsford, "Foreign Direct Investment as an Engine of Growth", *Journal of International Trade and Economic Development*, 8 (1), 1999, pp. 27-40; J. Damooei and A. Tavakoli, "The Effects of Foreign Direct Investment and Imports on Economic Growth: A Comparative Analysis of Thailand and the Philippines (1970-1998)", *Journal of Developing Areas*, 39 (2), 2006, pp. 79-100; A. Chowdhury and G. Mavrotas, "FDI and Growth: A Causal Relationship", *WIDER Research Paper No. 2005/25*, UNU-WIDER, Helsinki; H.G. Lheem and S. Guo, "Political Economy of FDI and Economic Growth in China: A Longitudinal Test at Provincial Level", *Journal of Chinese Political Science*, 9 (1) 2004, pp. 43-62; and UNCTAD, *World Investment Report 1992*, Geneva, 1992.

[6] C. Chen, L. Chang and Y. Zhang, "The Role of Foreign Direct Investment in China's Post-1978 Economic Development". *World Development*, 23 (4), 1995, pp. 691-703.

using bivariate vector autoregression (VAR) models, found that FDI's role in capital accumulation and therefore a growth-enhancing effect is positive in Panama and Sierra Leone.[7] Nair-Reichert and Weinhold (2001), upon performing Holtz-Eakin causality test on panel data from 24 developing countries, found that the growth rate of FDI results in a strong positive impact on GDP growth.[8]

FDI plays a positive role in economic growth and development through increased competition between foreign and domestic firms, human resource development (HRD), research and development (R&D), and transfer of advanced technology to the recipient economies — such arguments have gained substantial empirical ground. However, studies on the role of FDI on economic growth have been mainly focusing on some specific areas.

2.1 ***Transfer and Spillover of Advanced Technology***. Borensztein *et al* argued that FDI from multinational enterprises (MNEs) plays an important role in developing economies access to advanced technology, as MNEs are equipped with the most advanced technology due to their substantial investment in research and development (R&D). FDI plays a notable role in technological advancement in developing economies which helps attain a higher rate of growth through capital deepening in their production processes. They found that FDI has positive effects on economic growth in the host economies.[9]

Kohpaiboon tested "Bhagwati's hypothesis" that technology spillover is more likely in export promotion (EP) than import substitution (IS) industries. In the FDI-based Thai manufacturing sector, affirmation of this hypothesis was revealed based on cross-industry regression results.[10] In the case of a country in transition,

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[7] de Mello 1999, *op cit*.

[8] U. Nair-Reichert and D. Weinhold, "Causality Tests for Cross-Country Panels: A New Look at FDI and Economic Growth in Developing Countries", *Oxford Bulletin of Economics and Statistics*, 63 (2), 2001, pp. 153-171.

[9] Borensztein *et al* ,1998, *op cit*.

[10] A. Kohpaiboon, "Foreign Direct Investment and Technology Spillover: A Cross-Industry Analysis of Thai Manufacturing", World *Development*, 34 (3), 2006, pp. 541-556.

Estonia, Sinai and Meyer found that technological spillover was significant, and labour- and sales-intensive FDI generated larger spillovers than equity-intensive FDI.[11] Liu found large and significant spillover effects of FDI on 29 manufacturing industries in the Shenzhen Special Economic Zone of China in that it increased both the levels and growth rate of firm productivity from which the domestic sector mainly benefited.[12]

2.2 ***Impact on Domestic Firms***. In the case of developing countries like Bangladesh and Mauritius, Rhee and Belot show that entry of foreign firms led to a boom in the textile industry.[13] Conversely, Aitken and Harrison, examining the panel data from over 4000 Venezuelan plants, found that foreign investment had a negative impact on the productivity of domestic plants.[14] FDI is also believed to be associated with increased competition between domestic and foreign firms and improves the skill and efficiency among the former, thereby ultimately having a positive impact on total factor productivity (TFP) and economic growth.

2.3 ***Crowding in Domestic Investment***. FDI is believed to be associated with augmented capital accumulation in the host countries, particularly in developing ones. In that process, increased capital-labour ratio enhances economic growth. From a panel analysis of 69 developing countries, Borensztein *et al* found that FDI increases total investment more than one-for-one.[15] On the other hand, Agosin and Machado, in a panel analysis of 36 countries for 1971-2000, found that FDI left domestic investment unchanged for

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[11] E. Sinai and K.E. Meyer, "Spillovers of Technological Transfer from FDI: The Case of Estonia", *Journal of Comparative Economics*, 32, 2004, pp. 445-466.

[12] Z. Liu, "Foreign Direct Investment and Technology Spillover: Evidence from China", *Journal of Comparative Economics*, 30, 2002, pp. 579-602.

[13] J. W. Rhee and T. Belot, "Export Catalysts in Low Income Countries", *World Bank Working Paper*, World Bank, Washington, D. C. 1989.

[14] B. J. Aitken and A .E. Harrison, "Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela". *American Economic Review*, 89 (3), 1999, pp. 605-618.

[15] Borensztein *et al* 1998, *op cit.*

24 African and Asian countries, and crowded out investment in 12 Latin American countries.[16]

2.4 ***Human Capital***. FDI is said to have a substantial contribution to human resource development in the host economies. Borensztein *et al* found that the magnitude of FDI's influence on growth depends on human capital stock in the recipient country.[17] Using cross-country estimates of human capital stock in growth accounting regression, Benhabib and Spiegel found that human capital had a positive role in the growth rate of total factor productivity.[18] Ramirez found a significant and positive effect of FDI per-worker on the growth rate of labour productivity.[19]

2.5 ***Productivity, Efficiency and Growth***. Foreign firms tend to be more productive than local ones in developing countries. A recent study on Kenyan firms suggested that technology, export intensity and productivity were higher in foreign firms than domestic ones.[20] Higher efficiency of FDI leads to higher growth through interaction between foreign investment and human capital.[21] Balasubramanyam *et al* also found that FDI-labour (including human capital) interactions play an important role in the process of economic growth.[22]

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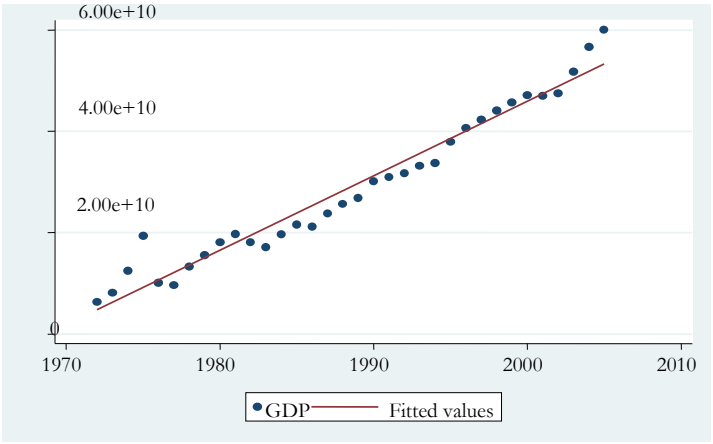
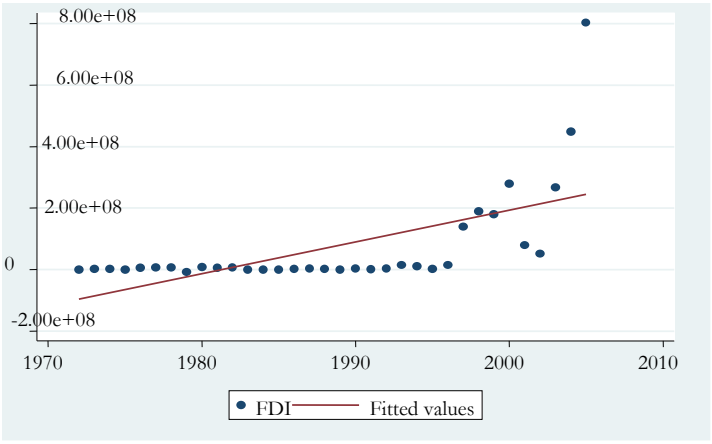
[16] M. R. Agosin and R. Machado, "Foreign Investment in Developing Countries: Does it Crowd in Domestic Investment?" *Oxford Development Studies*, 33 (2), 2005, pp. 149-162.
[17] Borensztein *et al*, 1998, *op cit*.
[18] Benhabib and Spiegel, 1994, *op cit*.
[19] M.D. Ramirez, "Is Foreign Direct Investment Beneficial for Mexico? An Empirical Analysis, 1960-2001", *World Development*, 34 (5), 2006, pp. 802-817.
[20] R. Rasiah and G. Gachino, "Are Foreign Firms more Productive and Export and Technology-Intensive than Local Firms in Kenyan Manufacturing?" *Oxford Development Studies*, 33 (2), 2005, pp. 211-227.
[21] Borensztein *et al*, 1998, *op cit*.
[22] Balasubramanyam *et al*, 1999, *op cit*.

Figure 2: Trend of GDP (top) and FDI (bottom) inflow in Bangladesh





As aforementioned, Bangladesh has attractive policy instruments and legislations for FDI[23], and it is directed mainly in the ready-made

[23] There are also some exceptions in welcoming FDIs, which contrast with the existing favourable policies and legal instruments. For example, the policy-makers have not been very positive about the recent mega-size FDI proposals. The decision on Indian Tata group's mutli-billion FDI proposal is yet to be made by the Bangladesh government. Another multi-billion

garments (RMG), natural resources (mainly gas and coal), manufacturing, and service (*e.g.* telecommunications) sectors. MNEs and joint ventures are increasingly taking part in mainly export-oriented industries. Among the Board of Investment (BOI)-registered investment proposals, during the periods 1981-1991 and 1991-2001, the share of foreign investment in total investment was 12 and 57.5 per cent respectively.[24] Given the documented multiple positive effects of foreign investment on economic growth in the host country, it is most likely that the effect of FDI on economic growth in Bangladesh is positive. However, using long-run data, Kumar and Pradhan found that FDI does not cause economic growth in Bangladesh.[25] But their paper is based on time series data for 19 years, from 1980 to 1999. They performed Granger causality test on 81 countries in order to assess whether there is causality between FDI and economic growth. Given this context, we develop econometric models in the following section in order to test whether FDI has an effect on growth in Bangladesh. The amount of net FDI flow has increased after the period. In the present paper we have taken larger dataset going beyond that period including the most recent ones, from 1972 to 2005, to examine exclusively if FDI is growth-enhancing in the country. The findings have been interpreted in section 4. Finally concluding remarks have been made.

3. Empirical Questions

3.1 *Does FDI Exert Influence on Domestic Output?*

In the neoclassical growth model, foreign investment enters into the production function to augment capital accumulation. In that process, the modified Cobb-Douglas production function becomes

$$Y = AL^{\alpha}K^{\beta}F^{\gamma} \qquad (1)$$

where, Y, L, K and F are output (GDP), labour, capital and foreign capital (FDI), respectively. A represents a set of policy and control variables that affects the productivity growth. For the

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recent FDI proposal of Mittal group has also not received the proper and positive attention of the government.

[24] See, for details, Bangladesh's Board of Investment website at *http://www.boi.gov.bd* , accessed on 25 August 2007.

[25] Kumar and Pradhan, 2002, *op cit.*

empirical purposes, taking logarithmic transformation and adding a stochastic error term the estimable equation becomes

$$\ln Y = \phi + \alpha \ln L + \beta \ln K + \gamma \ln F + e \qquad (2)$$

In equation (2), *ln* attached with each variable represents natural logarithmic transformation of the variables, and ln*A* and the stochastic error are denoted by Φ and *e* respectively. A positive and significant coefficient on ln*F* will support the hypothesis that FDI has a positive effect on overall economic growth performance controlling for other factors of production.

Now assuming that *F* influences the efficiency of *K* and *L* and thus *Y* through direct and spillover effects, the aggregate impact of FDI on economic growth can be tested using the following simple regression equation

$$GDP_t = a + bFDI_t + e_t \qquad (3)$$

Table 1: Regression Results (dependent GDP)

	Log-linear OLS Coefficient (standard error)	ARIMA Coefficient (standard error)
a	23.333***	2.42e+10***
	(0.258)	(1.95e+09)
b	0.041**	64.377***
	(0.017)	(8.848)
	Diagnostic	
Number of observations = 34	R^2 = 0.17	Sigma = 1.03e+10
	R^2-adj = 0.14	Wald $\chi^2(1)$ = 52.94***
	F = 6.13**	
	Heteroscedasticity Pr[χ^2 (1)] = 0.71	
	Normality Pr[χ^2 (2)] = 0.06	
	Model specification Pr [F(3,27)] = 0.00	

*** and ** imply significance at 1 and 5 per cent levels respectively.

The ordinary least squares (OLS) and autoregressive integrated moving average (ARIMA) regression results demonstrated in Table 1 indicates that FDI exerts statistically significant influence on

economic growth for the fitted regression on time series data from1972 to 2005. However, the log-linear OLS coefficient of FDI and the estimated *F* value are significant at 5 per cent level but the goodness of fit indicators R^2 and adjusted R^2 are quite low (0.17 and 0.14 respectively). This implies that although the overall fitness of the model is good, but FDI cannot substantially explain the variation of GDP growth.

The basic assumptions of the simple econometric model are that the residuals terms have equal variance and these are normally distributed. It is also assumed that there is no omitted variable bias in the model, that is, the model is correctly specified. Cook-Weisberg test[26] reveals that the error terms are homoscedastic[27], *i.e.*, have equal variance, but Jarque-Bera[28] test result accepts normality at 10 percent level of significance. On the other hand, Ramsey's[29] RESET test accepts the hypothesis that the model has been correctly specified.

Now given the fact that the share of net FDI inflow in GDP is meagre, it is less likely that foreign investment causes economic growth in the country. In order to test the null hypothesis we here perform a popular test called Granger causality test.[30]

3.2 *Does FDI Cause Output Growth and/or Vice Versa (or none)?*

As aforementioned, the existence of a positive and statistically significant relationship between FDI and GDP does not indicate

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[26] R. D. Cook and S. Weisberg, "Diagnostics for Heteroscedasticity in Regression", *Biometrika*, 70, 1983, pp. 1-10.

[27] According to Gujarati, if we take log transformation of the variables, the errors terms become homoscedastic. See, D. N. Gujarati, *Basic Econometrics*, (4th edition), McGraw-Hill International Edition, 2003.

[28] C. M. Jarque and A. K. Bera, "A Test for Normality of Observations and Regression Residuals", *International Statistical Review*, 55, 1987, pp. 163-172.

[29] J .B. Ramsey, "Tests for Specification Errors in Classical Linear Least Squares Regression Analysis", *Journal of the Royal Statistical Society*, Series B, 31, 1969, pp. 350-371.

[30] C. W. J. Granger, "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods", .*Econometrica*, 37 (3), 1969, pp. 434-448.

causality or the direction of influence, *i.e.*, whether FDI causes GDP growth or vice-versa, both or none. The Granger causality test identifies the direction of such influence. The basic underlying assumption is that the test is performed on time series data. Now we use the following formula to perform the test:

$$GDP_t = \sum_{i=1}^{n} \alpha_i FDI_{t-i} + \sum_{j=1}^{n} \beta_j GDP_{t-j} + e_{1t} \quad (4)$$

$$FDI_t = \sum_{i=1}^{n} \lambda_i FDI_{t-i} + \sum_{j=1}^{n} \delta_j GDP_{t-j} + e_{2t} \quad (5)$$

where the disturbance terms e_{1t} and e_{2t} are assumed to be uncorrelated. Equation 4 postulated that current GDP is related to its past values and current value of FDI, and Equation 5 postulated the same behaviour of FDI.

Table 2: Granger Causality Test

Null Hypothesis	Computed F	Prob(F)
FDI does not cause GDP	0.357	0.70
GDP does not cause FDI	0.921	0.41

The calculated F values for Equations 4 and 5 turn out to be statistically insignificant (Table 2), which suggests that the GDP and FDI variables are independent. That is, there is no causal relationship between the two. However, the result of Equation 4 contrasts with the log-linear regression model (Table 1) where we found FDI to be significant. But since we are dealing with time series data of two macroeconomic variables which generally tend to be non-stationary, we have to confirm about the stationarity or randomness of the data series used in the present study.

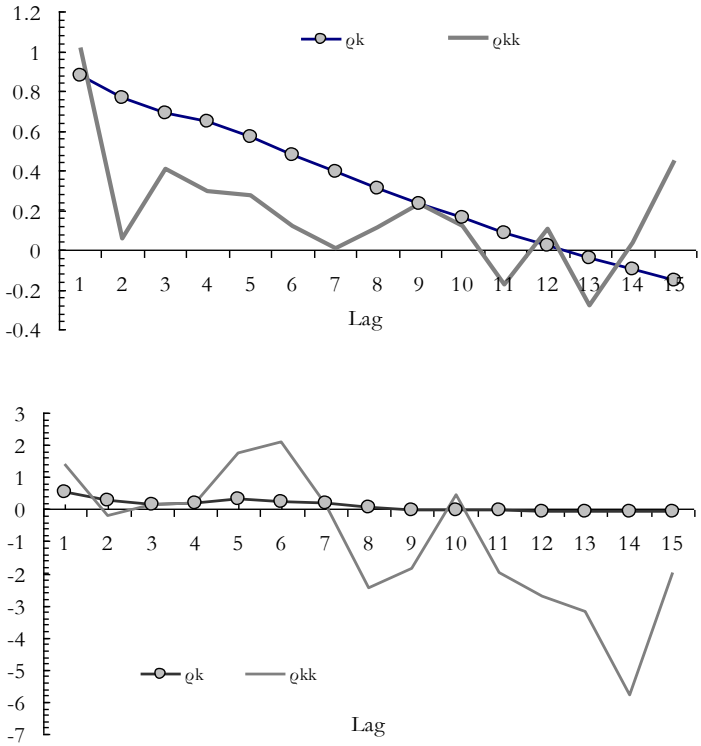
3.3 *Are the Two Series Stationary?*

If the time series data are non-stationary, the OLS regression may result in spurious regression, and traditional diagnostic tests like *t* and *F* become non-standard.[31] Some of the preliminary tests for

[31] Gujarati, 2003, *op cit.*

stationarity are autocorrelation ($\hat{\rho}_k$), partial autocorrelation ($\hat{\rho}_{kk}$), and Ljung-Box (LB) statistic.[32]

Figure 3: Autocorrelation and Partial autocorrelation for GDP (top) and FDI (bottom), 1972-2005



The formula of autocorrelation function is $\hat{\rho}_k = \frac{sample\text{cov}at\,lag\,k}{\text{var}}$, and it is a pure number lies between ±1. In the similar fashion, partial autocorrelation measures correlation between observations that are *k* apart after controlling for correlations at lag less than *k*. On the other hand, Ljung-Box (LB)

[32] G. M. Ljung and G. P.E. Box, "On a Measure of Lack of Fit in Time Series Models", *Biometrika*, 66, 1978, pp. 66-72.

statistic, defined by $LB = n(n+2)\sum_{k=1}^{m}\left(\frac{\hat{\rho}_k^2}{n-k}\right) \approx \chi^2 m$, follows chi-square distribution where n = sample size and m = lag length.

For series GDP, as the Figure 3 shows, $\hat{\rho}_k$ has always been within plus and minus 1 and gradually approaching zero as the number of lags increases. From lag 2, $\hat{\rho}_{kk}$ is also within plus and minus 1 and hovering around zero. $\hat{\rho}_k$ of series FDI shows that it starts at 0.55 and then becomes significantly lower (0.14) at lag 3. Conversely, $\hat{\rho}_{kk}$ altered sign at the second lag. According to Schwarz criterion[33], the maximum number of lags is nine. In the present case, series GDP alters sign at lag 13, but at lag 9 $\hat{\rho}_k$ is much lower (0.23) compared to that of lag 1. These demonstrate that the series FDI is undoubtedly stationary, but it is uncertain from the AC and PAC whether series GDP is stationary. On the other hand, Ljung-Box statistics for GDP and FDI suggest that the hypothesis of non-stationary is rejected at 0.5 and 5 per cent levels. That is, both of the series are stationary.

A popular test for detecting stationarity is the unit root test. In the present context, the stochastic or unit root process starts as follows:

$$GDP_t = \rho_1 GDP_{t-1} + e_{1t} \tag{6}$$

$$FDI_t = \rho_2 FDI_{t-1} + e_{2t} \tag{7}$$

The difference between the variables at t and $t–1$ would provide new equations with other coefficients (ξ_1 and ξ_2, respectively) of independent variables. If we let those equal zeros, the estimated t value of ξs follows τ or Dickey-Fuller (DF) statistic.[34] However, the basic assumption of the DF test is that e_ts are not correlated. But, if

[33] G. Schwarz, "Estimating the Dimension of a Model", *Annals of Statistics*, 6 (2), 1978, pp. 461-464.

[34] D. A. Dickey and W. A. Fuller, "Distribution of the Estimators for Autoregressive Time Series with a Unit Root", *Journal of the American Statistical Association*, 74, 1979, pp. 427-431.

e_ts are correlated, the augmented Dickey-Fuller (ADF) test can be applied using the following equations:

$$\Delta GDP_t = \beta_1 + \beta_2 t + \delta GDP_{t-1} + \alpha_i \sum_{i=1}^{m} \Delta GDP_{t-i} + e_{1t} \quad (8)$$

$$\Delta FDI_t = \lambda_1 + \lambda_2 t + \psi FDI_{t-1} + \phi_i \sum_{i=1}^{m} \Delta FDI_{t-i} + e_{2t} \quad (9)$$

where α and Φ provide the ADF statistic. The estimated DF and ADF statistics, from equations 6 to 9, are given in Table 3.

Table 3: Unit Root Tests for GDP and FDI

	DF		ADF	
	$\hat{\rho}_1$	$\hat{\rho}_2$	$\hat{\alpha}_i$	$\hat{\phi}_i$
Computed	.	2.972	0.609	1.646
Critical 1%	– 3.696		– 3.649	
5%	– 2.978		– 2.955	
10%	– 2.620		– 2.616	

The MacKinnon critical values[35] for rejecting the null hypothesis of a unit root is accepted for GDP but rejected for FDI at 10 per cent level while applying the DF test. This indicates that FDI is stationary but GDP is not. On the other hand, in the ADF test, both GDP and FDI series are observed to be non-stationary.

Against the assumption in DF and ADF that that $\boldsymbol{e_t}$ is independently and identically distributed, the Phillips-Perron (PP) unit root test[36] is a non-parametric test that takes care of serial correlation in $\boldsymbol{e_t}$ without adding lagged GDP and FDI. In this case, the estimated PP statistic for GDP ($\hat{\rho}_{GDP}$) is 0.87, whereas the 10 per cent critical value for $Z(\rho)$ is – 10.36. This means series GDP is

[35] J. G. MacKinnon, "Critical Values of Cointegration Tests" in R. E. Engle and C. W. J. Granger (eds.), *Long-Run Economic Relationships: Readings in Cointegration*, New York: Oxford University Press, 1991.
[36] P. C. B. Phillips and P. Perron, "Testing for a Unit Root in Time Series Regression", *Biometrika*, 75, 1988, pp. 335-346.

non-stationary. On the other hand, $\hat{\rho}_{FDI}$ is 12.72, *i.e.*, series FDI is stationary at 10 per cent level.

3.4 *Are GDP and FDI Cointegrated?*

Against the caution that regression on a non-stationary time series may produce erroneous regression, various test results from above confirm that series FDI is stationary (except only ADF). In this case, since one of the two series is non-stationary, we have to identify if FDI and GDP are cointegrated, *i.e.*, whether there is a long-term or equilibrium relationship between the two variables. We follow the Johansen procedure for testing cointegration.[37]

Table 4: Test for Cointegration

Null Hypothesis	Maximum Eigenvalue	5% critical value
$\rho = 0$	0.129	15.41
$\rho \leq 1$	0.001	3.41

Table 4 shows that estimated maximum eigenvalue rejects any cointegration between GDP and FDI. This means we do not have any spurious regression (OLS and ARIMA) while estimating the influence of FDI on GDP.

4. Interpretation of the Results

Foreign investment, through various direct impacts and spillovers, exerts influence on growth of domestic output. Despite a number of favourable policies and laws the FDI flow is very small in Bangladesh. According to the test results, it is clear that foreign investment has notable positive impact in explaining positive changes in GDP. But the diagnostic tests like R^2 and adjusted R^2 imply that there are other macroeconomic variables which we did not bring into the present analysis that might have significant impact, individually and/or jointly, on economic growth. The causal relationship between the two variables was found to be Granger-neutral, which implies that FDI does not cause economic growth and

[37] S. Johansen, "Statistical Analysis of Cointegrating Vectors", *Journal of Economic Dynamics and Control*, 12, 1988, pp. 231-54.

vice versa. One reason may, of course, be the low level of the net flow of FDI compared to the size of GDP (only 1.35 per cent in 2005 and before that year it was even lower than 0.8 per cent). With this meagre magnitude, FDI is unable to exert a substantial positive effect on growth. Time series tests confirm that FDI data series is stationary but GDP is not. We also find no long-term or equilibrium relationship between the two.

There may be other reasons of such empirical evidence against foreign investment. Data suggest that FDI, whatever the amount, is directed to the sectors that either have meagre share in GDP or are not growth sectors. For example, in fiscal year 2003-04, as high as 61.46 per cent of FDI accounted for in service sector and around 16 per cent was directed to textile sector. The other important sectors that could attract foreign investment were chemical, agro-based industry, and food and allied (6.88, 6.49 and 3.29 per cent respectively). However, service sector was almost half of GDP at that time, and growth of the sector was also not very low. One of the attractive sub-sectors of FDI is telegraph and telephone (particularly booming cellular phone), of which growth rate was 14.56 per cent in 2003-04, but its share was very low in GDP, only 1.41 per cent for which it cannot significantly influence economic growth in Bangladesh.[38]

International oil companies (IOCs) are investing substantially in gas and coal fields. Though the growth rate of natural resource and mining sector has been high (7.1 per cent in 2003-04 and around 7 per cent in the last years), this sector has very negligible share in GDP (only 1.11 in 2003-04 and not exceeding 1.19 per cent from 1996-97 onwards). There is an allegation that the IOCs are overvaluing their investment in capital good by demonstrating old machinery as new ones hiding the actual depreciation cost. If it is true, still then we cannot claim that overvaluation of capital equipment is responsible for the absence of causal flow of FDI to GDP. However, manufacturing industry has been performing well since early the 1990s, and its contribution to GDP has been around one-sixth and its growth rate is also good over the years (7.1 per cent

[38] Ministry of Finance, *Bangladesh Economic Review 2006*, Dhaka: Government of Bangladesh, 2007.

in 2003-04).[39] Greater flow of foreign investment in this sector, particularly in textile industry, has intrinsically positive influence on domestic output and its growth. Another reason of less importance of FDI in economic growth may be the full entitlement of repatriation of profit and dividend. These two areas deserve and subject to new and substantial empirical investigation. However, based on the above discussion, it may be said that meagre amount of FDI itself is responsible for the evidence of Granger-neutrality.

5. Conclusion

In this study we find that although foreign investment exerts influence on Bangladesh's domestic output, we did not find that it causes any GDP growth. However, the existence of no causal relationship does not mean the absence of the contribution of foreign investment to economic growth in the country. Kumar and Pradhan, show that FDI causes economic growth in Pakistan.[40] In order to let foreign investment play such a role the government should welcome more foreign participation in the industrial and agro-processing sectors. To attract more foreign investment there is a need for bringing about pro-FDI policy reforms so that FDI can play desirable role in the host sectors through high rate of return. Introducing and implementing competition policy would be one of the major policy instruments to foster these sectors. Special measures such as tax holiday and improvement of governance in individual sectors would be the other policy directions. However, the country should welcome FDI bearing in mind the direct and indirect effects and spillovers, and also the probable negative effects on growing local industries.

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[39] *Ibid*.

[40] Kumar and Pradhan , 2002, *op cit*.

Annex

Table: Trend of GDP and FDI inflow in Bangladesh

Year	GDP (in US$)	Net FDI Inflow (in US$)	Net FDI as %age of GDP
1972	6288200000	100000	0.002
1973	8067000000	2300000	0.029
1974	12459000000	2200000	0.018
1975	19396000000	0	0.000
1976	10083000000	5400000	0.054
1977	9632500000	7000000	0.073
1978	13299000000	7700000	0.058
1979	15586000000	-8000000	-0.051
1980	18115000000	8500000	0.047
1981	19763000000	5400000	0.027
1982	18087000000	7000000	0.039
1983	17156000000	400000	0.002
1984	19670000000	-600000	-0.003
1985	21613000000	0	0.000
1986	21160000000	2400000	0.011
1987	23781000000	3200000	0.013
1988	25639000000	1800000	0.007
1989	26825000000	200000	0.001
1990	30129000000	3000000	0.010
1991	30957000000	1000000	0.003
1992	31709000000	4000000	0.013
1993	33167000000	14000000	0.042
1994	33769000000	11000000	0.033
1995	37940000000	2000000	0.005
1996	40666000000	14000000	0.034
1997	42319000000	139000000	0.328
1998	44092000000	190000000	0.431
1999	45694000000	180000000	0.394
2000	47097000000	280000000	0.595
2001	46953000000	79000000	0.168
2002	47513000000	52000000	0.109
2003	51824000000	268000000	0.517
2004	56676000000	449000000	0.792
2005	60034000000	802490000	1.337

Data Source: World Bank (2006, 2007). *World Development Indicators*, World Bank, Washington, DC (CD-ROM).