

## **DETERMINANTS OF FOREIGN DIRECT INVESTMENT IN BANGLADESH: AN ECONOMETRIC ESTIMATION**

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### **Abstract**

*This study examines the various economic factors effects on foreign direct investment (FDI) inflows into Bangladesh during the study period ranging from 1972 to 2010. Log linear regression model has been used and the method of least squares (OLS) has been applied to estimate the various determinants effects on FDI inflows. In the models, dependent variable is Natural Log of real foreign direct investment. Independent variables are market size proxied by natural log of real GDP, Trade Balance, Labor productivity expressed by natural log of productivity indices of industrial labor in selected industries (Jute, Cotton, Paper, Steel, Cement, and Fertilizer). According to the econometric results, market size has positive sign and is statistically significant. Trade balance is found positive sign and statistically significant. Labor productivity has positive sign but not significant.*

**Keyword:** Foreign Direct Investment, Determinants of FDI, Unit Root Test, OLS

## INTRODUCTION

Economic growth in every country depends upon the sustain growth of captive capacity, supported by savings and investment. Low levels of savings and investment particularly in developing countries and least developed countries results in a low level of capital stock and economic growth. Bangladesh which was known as a third world country during the era of cold war, is now either called a “developing country” or in world bank vocabulary “a low income country”. With a population of more than 130 million and per capita GDP below US\$400, we need to attract Foreign Direct Investment (FDI) to create employment, generate income and FDI is considered as a crucial ingredient for economic development of a developing country and can play an important role in achieving the countries socio-economic objectives including poverty reduction goals. Countries that are lagging behind to attract FDI are now formulating and implementing new policies for attracting more investment. Industrial development is one of the pre-requisites for economic growth, particularly in a developing country. Moving from the agrarian economy to industrial economy is imperative for economic development. Bangladesh is an example in this regard. In a capital poor country like Bangladesh FDI can emerge as a significant vehicle to build up physical capital, create employment opportunities, developed productive capacity, enhance skills of local labor through transfer of technology and managerial know-how and help integrate the domestic economy with the global economy.

The determinants which play as a driving force for attracting FDI are geographical location, cheap labor cost & Government attitude towards liberalization of the existing laws of the host country, skilled manpower, incentives for investors& exemption of taxes. The objectives of the study are:

- To evaluate the trend of FDI inflows in Bangladesh;
- To highlight the incentives and facilities provided by the Government institutions for encouraging FDI in Bangladesh;
- To identify the main determinants of FDI inflows in Bangladesh as a developing country based on time series data;
- To suggest policy measures for the improvement of foreign direct investment based on the empirical results.

## LITERATURE REVIEW

FDI is considered as an important tool for economic development in a developing country. If the investing country is wealthier than the host country then capital will flow to the host country (Zhao, 2003). It contributes to growth of GDP; create employment generation, technology transfer, human resource development, etc. It is also perceived that FDI can play a significant role to reduce poverty of a developing country.

Foreign Direct Investment can be defined as investment in which a firm acquires a substantial controlling interest in a foreign firm or set up a subsidiary in a foreign country (Chen, 2000). IMF (1993, 2003) and OECD (1996) defined FDI as a long term investment by a foreign investor in an enterprise resident in an economy other than foreign direct investor is based. According to the Balance of Payment Manual (1977 and 1993) FDI refers to investment made to acquire lasting interest in enterprises operating outside of the economy of the investor.

In the developing world, the East Asian countries - South Korea, Hong Kong, Taiwan and Singapore were the first to use effectively the FDI from TNCs to achieve economic development (Sinha, 2007). After opening up their economy towards FDI, these countries emerged as 'Asian Tigers' and witnessed rapid economic developed within a relatively short period of time. In recent years, many countries have introduced open door policy to attract FDI with a view to increase investment, employment, productivity and economic development (Agiomirgianakis *et al.*, 2003). A number of empirical studies have shown that developed and developing countries both desire to attract FDI. Developing countries always are in disadvantage in terms of technology, capital, and human resources at the early stage of development.

In FDI literature it is already recognized that FDI not only brings capital for productive development to the host economy, it also transfers a considerable amount of technical and managerial knowledge and skills, which is likely to spill over to domestic enterprise in that economy (Balasubramanyam *et al* 1996; Kumar and Podhan,2002). It is recognized that FDI can contribute to the growth of GDP, Gross Fixed Capital Formation (GFCF) (total investment in a host economy) and balance of payments (Baskaran and Muchie, 2008).

Most Developing countries are always at a disadvantaged position in terms of technology and in this regard FDI contribute to transfer technology and can contribute towards income, production, prices, employment, economic growth, development and general welfare of the host country (Kok and Ersoy, 2009).

Agiomirgianakis *et al* (2003) suggested that as FDI increases the total output of the host country, it eventually contributes to the economic development of the host country. To achieve industrial expansion a country should produce high quality products and accomplish market efficiency. To facilitate this technological development is imperative. A developing country like Bangladesh that is at an early stage of development has to rely on FDI as an important vehicle to bring in technological development. Hence, it is perceived that FDI is capable of increasing the technical capabilities of the host country.

According to Sun (1998) FDI has extensively helped economic growth in China by enriching domestic capital formation, increasing exports, and creating new employment.

Khoda (2003) stated that FDI can raise domestic capital, engender employment by using underutilized labor, build up organizational formation as well as managerial standards of the host country, transfer technology, get better internal and overseas marketing network and also assist to improve the technical expertise of the Government. It is argued that “MNEs are subject to use up more on R&D abroad than at home and their foreign affiliates act comparatively better in terms of productivity” (Chen, 2000, p. 37). Mmieh and Frimpong (2004) study on the FDI experience in Ghana reveals that the economic reform has contributed to attracting significant multinational investment. They also stated that changes to policies and regulations have helped to increase FDI inflow in China, India, Korea and Mexico.

Agrawal (2000) scrutinized the economic impact of Foreign Direct Investment in South Asia by undertaking time- series, cross- section analysis of panel data from five South Asian countries; India, Pakistan, Bangladesh, Sri Lanka and Nepal, and concluded that there existed complementarily and linkage effects between foreign and national investment. However, using time series data from the Sri Lankan economy, Athukorala (2003) showed that FDI inflows did not exert an independent influence on economic growth and the direction of causation was not towards from FDI to GDP growth but GDP growth and the direction of causation was not towards from FDI to GDP growth but GDP growth to FDI.

Hermes and Lensink (2000) interestingly summarized different channels through which positive externalities associated with FDI can occur namely: i) competition channel where increased competition is likely lead to increased productivity, efficiency and investment in human and/or physical capital. Increased competition may lead to changes in the industrial structure towards more competitiveness and more export-oriented activities; ii) training channel through increased training of labour and management; iii) linkages channel whereby foreign investment is often accompanied by technology transfer; such transfers may take place through transactions with foreign firms and iv) domestic firms imitate the more advanced technologies used by foreign firms commonly termed as the demonstration channel.

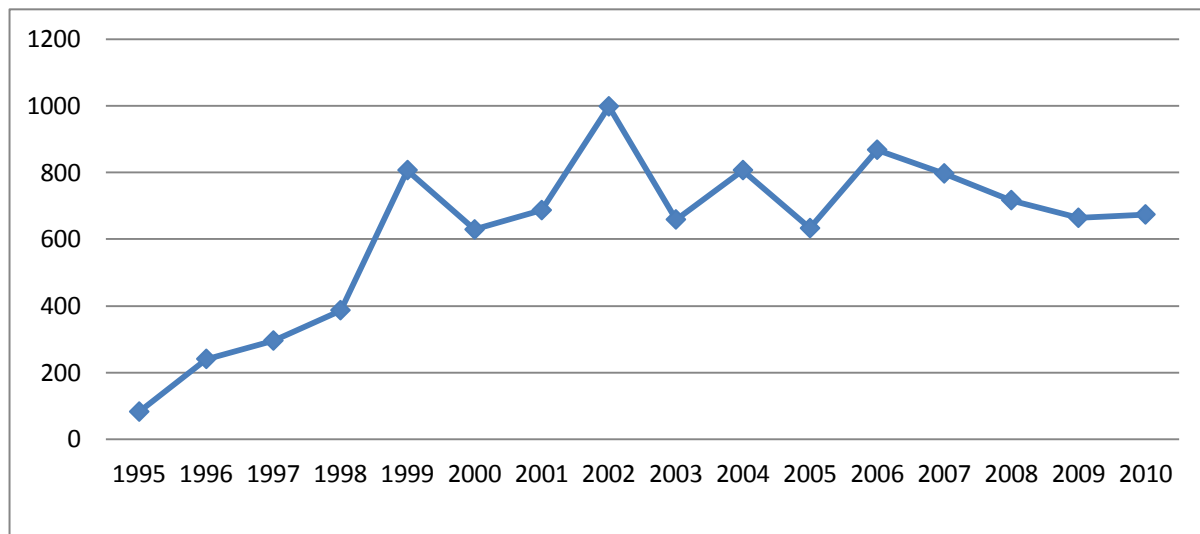
Lan (2006) compared Vietnam to other developing countries applying a simultaneous equation model to test the relationship between FDI and economic growth whose finding was that FDI had a positive and statistically significant impact on economic growth in Vietnam over period 1996-2003, and economic growth in Vietnam was viewed as an important factor to entice FDI inflows into Vietnam. Taking account of macroeconomic environments (degree of trade openness, income per capita and macroeconomic stability in MENA countries), Jallab, Gbakou, and Sandretto (2008) assessed the growth-effect of FDI, using data from MENA countries on period 1970-2005 and summarized that there was no significant independent impact of FDI on

economic growth in MENA countries. Even, the lack of growth effect of FDI did not depend on the degree of trade openness and income per capita.

Kindleberger (1969) provided theoretical evidence that for a foreign-owned firm, it is not a good condition for FDI if the firm has the option of licensing the advantage to an indigenous producer and product is exported to host country. Due to tariff or transport cost barriers, it will not be possible and profitable although the other conditions have to be fulfilled for raising FDI. He pointed out that a company's final investment decision is usually based on low taxation once a venture takes off the ground. Besides, a company must have the ability to source goods and services from its operating unit in one market in order to serve nearby markets or maximize its global efficiency.

### FDI Trend in Bangladesh

Figure-1: FDI Trend during 1995-2010 (US \$ in million):



Source: Various Statistical Year Book Bangladesh (1995-2010)

This graph portrays inconsistent proceedings of the FDI in Bangladesh since 1995. It is a matter of great concern that in spite of comparative advantages in labor-intensive industries and adoption of investment friendly policies and regulations, FDI flows have failed to be accelerated. However, the year 2002 shows a substantial improvement in FDI achievement.

## METHODOLOGY

The study is based on secondary data and the data is drawn from different sources comprise time series data of Bangladesh period of 1972-2010. The data sources include annual reports of different government institutions, concerned ministries and concerned corporate offices, research journals, investment surveys conducted by BOI, statistical year book of Bangladesh, publications of BOI and BEPZA, World Investment Reports of UNCTAD, Economic survey of Bangladesh and previous studies in the field of study. Some information has also been collected from the daily newspapers and internet sources. All the secondary data collected from printed materials of the BOI, different government agencies, websites and all other sources. All these sources of data are recognized and accepted by all and the provided information have been used widely in the country, so data and information of these sources incorporated in this project are reliable.

Different time series econometric and inferential statistical techniques were used to validate the result, where every technique has some pros and cons relating to estimation and using different methods in same study can bring a robust answer. The inferential statistics, such as regression, correlation, stationary test (unit root), hypothesis testing and other techniques of econometric analysis have been used in this study.

Country-specific studies on the south-Asian region find that FDI inflow to south-Asian countries has been affected by structural factor such as Market size, GDP Growth rate, inflation rate, Extent of urbanization, Availability of quality infrastructure, Investment incentives and Performance requirements. Thus, most of the relevant variables considered are based on the theories and the previous empirical literatures for examining the determinants of FDI in Bangladesh. After reviewing all the potential determinants of FDI, we adopt the final FDI function below:

$$\ln(\text{FDI})_t = \beta_0 + \beta_1 \text{MKTSZ}_t + \beta_2 \text{TRDBLN}_t + \beta_3 \text{LBRPRD}_t + U_t$$

$U_t$  is the error term with white noise properties and  $\beta_0$  is a scalar parameter,  $\beta_1, \beta_2, \beta_3$  are the parameters of interest. Other factor which have influence on inward FDI, neglecting here for modeling difficulty and lack of appropriate data availability for the assigned study period.

### Variable Definitions and Data Sources

1. **ln (FDI)** = Natural Log of real foreign direct investment registered with BOI (Billions of taka). Source: Bangladesh Investment Handbook, 2010 and previous issues and UNCTAD, World Invest Report-2008.
2. **MKTSZ** = Host country market size proxied by natural log of real GDP (Billions of taka). Source: Statistical year book of Bangladesh (BBS), 1981, 1991, 2001, 2008, 2010.

3. **TRDBLN** = Host country Trade Balance (Export- import) (Billions of taka) Source: [www.adb.org/statistics](http://www.adb.org/statistics). Bangladesh Economic Review, 2011.
4. **LBRPRD** = Labor productivity, expressed by natural log of productivity indices of industrial labor in selected industries (Jute, Cotton, Paper, Steel, Cement, Fertilizer). Source: Statistical year book of Bangladesh (BBS), 1981, 1991, 2001, 2007, 2010.

Domestic market characteristics are expressed by the market size and trade flows. The market size (MKTSZ) is measured by the host country real GDP and emphasizes the importance of a large market for efficient utilization of resources. A direct relationship is expected between MKTSZ and inward FDI. The relationship between the direction of the host country trade balance (TRDBLN) and FDI inflow appears to be complex. Trade surpluses are indicative of a strong economy and may encourage the inflow of FDI. Trade deficits, on the other hand, may stimulate inward FDI as a result of export diversification and import substitution policies. Labor productivity (LBRPRD) is expected to directly affect the ability of the host country to attract FDI.

## EMPIRICAL ANALYSIS

### The Unit Root Test

A test of stationarity or non-stationary that has become widely popular over the past several years is the unit root test. So we use Dickey-Fuller (DF) test to operate the unit root test. We consider following equation;

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + U_t$$

Both hypotheses are,

$$H_0: \delta = 0 \quad [\text{Time series is non-stationary}]$$

$$H_a: \delta < 0 \quad [\text{Time series is stationary}]$$

If the null hypothesis is rejected, it means that  $Y_t$  is a stationary time series. Dickey-Fuller have shown that under the null hypothesis that  $\delta = 0$ , the estimated value  $t$  value of the coefficient of  $Y_{t-1}$  in above equation follows the  $\tau$  (tau) statistic (D.N. Gujarati, 1995). The computed  $p$ -value is less than even the 5 percent critical value in absolute terms then null hypothesis is accepted and conclusion is that the time series is non-stationary. The unit root test results are shown in Table 1 (According to Appendix-1).

Table-1: Results of unit root test

VARIABLE	NULL HYPOTHESIS	P-VALUE	CRITICAL VALUE 5%	DECISION
Ln(FDI)	A(1)=0, T-TEST	0.1651	0.05	H <sub>0</sub> accepted
MKTSZ	A(1)=0, T-TEST	0.9998	0.05	H <sub>0</sub> accepted
TRDBNL	A(1)=0, T-TEST	1.0000	0.05	H <sub>0</sub> accepted
LBRPRD	A(1)=0, T-TEST	0.7759	0.05	H <sub>0</sub> accepted

Here dependent variable Ln(FDI) and other independent variables such as MKTSZ, TRDBNL and LBRPRD, all are individually I(1); that is they are non-stationary and contain a unit root. So the regression of a non-stationary time series on other non-stationary time series may produce a spurious regression. Though all variables are non-stationary, but if all independent variables are co-integrated with the dependent variable Ln(FDI), then the produced regression will not be spurious. So we have to operate co-integration technique with help of E-VIEWS.

### Co-Integration Test

Table-2: Results of co-integration test (According to Appendix-2)

COINTEGRATING REGRESSION-CONSTANT, TREND NO. OBS, 38		
Co-integration between Ln(FDI) & all independent variables T-TEST	REGRESSAND: Ln(FDI)	
	R-SQUARE=0.329	DURBIN-WATSON=2.07
	P-VALUE	CRITICAL VALUE 5%
	0.0021	0.05
<b>Decision:</b> MKTSZ, TRDBNL, and LBRPRD all are co-integrated with dependent variable Ln(FDI)		

The result indicates us that we can reject the null. It means that the variables are co integrated. So if we apply OLS method, regression result of this model will not be spurious.



### Descriptive statistics of major variables

With the help of E-views, the descriptive statistics of  $\ln(\text{FDI})$ , MKTSZ, TRDBLN, LBRPRD are as follows:

Table- 3: Descriptive statistics

	$\ln(\text{FDI})$	MKTSZ	TRDBLN	LBRPRD
Mean	1.255591	7.287130	-110.8872	4.838070
Median	1.444563	7.229955	-64.00000	4.849997
Maximum	4.962425	8.188820	-0.140000	5.565991
Minimum	-4.605170	6.489995	-364.6400	3.599775
Std. Dev.	2.611676	0.500763	112.3693	0.530624
Skewness	-0.507957	0.199321	-1.013679	-0.680278
Kurtosis	2.321303	1.884343	2.833744	2.854444
Jarque-Bera	2.425658	2.280858	6.723963	3.042482
Probability	0.297355	0.319682	0.034667	0.218441
Sum	48.96805	284.1981	-4324.600	188.6847
Sum Sq. Dev.	259.1924	9.529005	479820.8	10.69934
Observations	39	39	39	39

From the Table-3 it is seen that the frequency distributions of all major variables are not normal. The skewness coefficient is less than unity, generally taken to be fairly extreme (Chou, 1988, P.109). Statistician Kendall (1943) calculated the expected normal kurtosis equal to  $3(n-1)/(n+1)$ , where,  $n$ =Sample Size. According to this rule in a Gaussian distribution, it can be calculated for these data to have a kurtosis co-efficient of 2.846 for all the major variables respectively. Kurtosis generally either much higher or lower than the above calculated values indicates extreme leptokurtic or extreme platykurtic.

In this data set, the value of 2.321, 1.884, 2.833 and 2.854 for  $\ln(\text{FDI})$ , MKTSZ, TRDBLN and LBRPRD respectively fall under the platykurtic distribution. Generally values for skewness zero ( $\beta_1=0$ ) and kurtosis value 3 ( $\beta_2=3$ ) indicate that the observed distribution is perfectly normally distributed. Therefore skewness and platykurtic frequency distribution of major variables on FDI indicates that the distribution is not normal.

### OLS Estimation

Estimated results with Ordinary Least Square method has been reported in Table-4. (According to Appendix -3), along with the model summary in Table 5 and ANOVA results in Table 6.

Table -4: Regression Results

	Coefficient	Std. Error	t-Statistic	Prob.
C	-54.33731	8.664915	-6.270957	0.0000
MKTSZ	7.855486	1.463339	5.368191	0.0000
TRDBLN	0.015921	0.005533	2.877393	0.0068
LBRPRD	0.023645	0.778855	0.030359	0.9760

Table-5: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.891	.793	.775	1.239	1.24

Table-6: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	205.84	3	68.6	44.61	.000
Residual	53.73	35	1.54		
Total	259.57	38			

The fitted line is reasonably good. The goodness of fit,  $R^2$  shows that the independent variables explain about 79.30% of the variations in the dependent variable. The estimated coefficients have all expected signs except TRDBLN. The coefficient of the Market Size is 7.86, implying that a one percent increase in total Market Size increases the FDI by 7.86 percent. Similarly a one percent increase in Labor Productivity will increase the FDI by 0.02 percent. Since, the sign of TRDBLN is not expected. So, we cannot explain the effect of TRDBLN in this model. The estimated regression equation is reproduced below:

$$\ln(\text{FDI}) = -54.337 + 7.855\text{MKTSZ} + 0.015\text{TRDBLN} + 0.023\text{LBRPRD}$$

The results show that MKTSZ (natural log of Real GDP) is the most significant factor affecting FDI inflow into the Bangladesh. We get positive sign and statistically significant. In Bangladesh trade deficit is a continuous process, so negative sign is expected but we get positive sign and statistically significant. Labor productivity (LBRPRD), which is one of the major determinants of FDI in Bangladesh, is statistically insignificant.

### The “F” test

The null and alternative hypothesis are:

$$H_0: \beta_1 = \beta_2 = \beta_3 = 0$$

$$H_a: \beta_1 = \beta_2 = \beta_3 \neq 0$$

(i.e.  $\beta_1, \beta_2, \beta_3$  are not simultaneously zero)

According to Appendix-3 the calculated ‘F’ value is 44.61 while the critical value of ‘F’ is 2.87 at the 5% level of significance with (3, 35) df. As a result the null hypothesis is rejected. That is, the estimated equation is significant.

### Test for Functional form and Omitted variables

Ramsey’s “RESET” test can be used to this purpose. Reset stands for Regression Specification Error Test and was proposed by Ramsey (1969). RESET is a general test for the following types of specification errors:

Omitting variables included irrelevant ones, chosen a wrong functional form and correlation between explanatory variables and error term. The test procedure is as follows:

Firstly the original equation:

$$\ln(FDI)_t = \beta_0 + \beta_1 MKTSZ_t + \beta_2 TRDBLN_t + \beta_3 LBRPRD_t + U_t$$

is run and from the estimated equation fitted values of  $\ln(FDI)$  i.e.  $\widehat{\ln(FDI)}_i$  is obtained. And then the following regression is run:

$$\ln(FDI)_t = \beta_0 + \beta_1 MKTSZ_t + \beta_2 TRDBLN_t + \beta_3 LBRPRD_t + \delta_1 \widehat{\ln(FDI)}_t^2 + \delta_2 \widehat{\ln(FDI)}_t^3 + V_t$$

$$H_0: \delta_1 = \delta_2 = 0; \quad F_{cal} = 37.32 > 3.30; \text{ and } p\text{-value}(0.000) < 0.05$$

(According to Appendix-4)

Now  $\delta_1$  and  $\delta_2$  are statistically insignificant then it can be concluded that there is no problem with functional form or omitted variables. So, we can say that this model does not contain serious problem of functional form and omitted variable.

### Jarque –Bera test

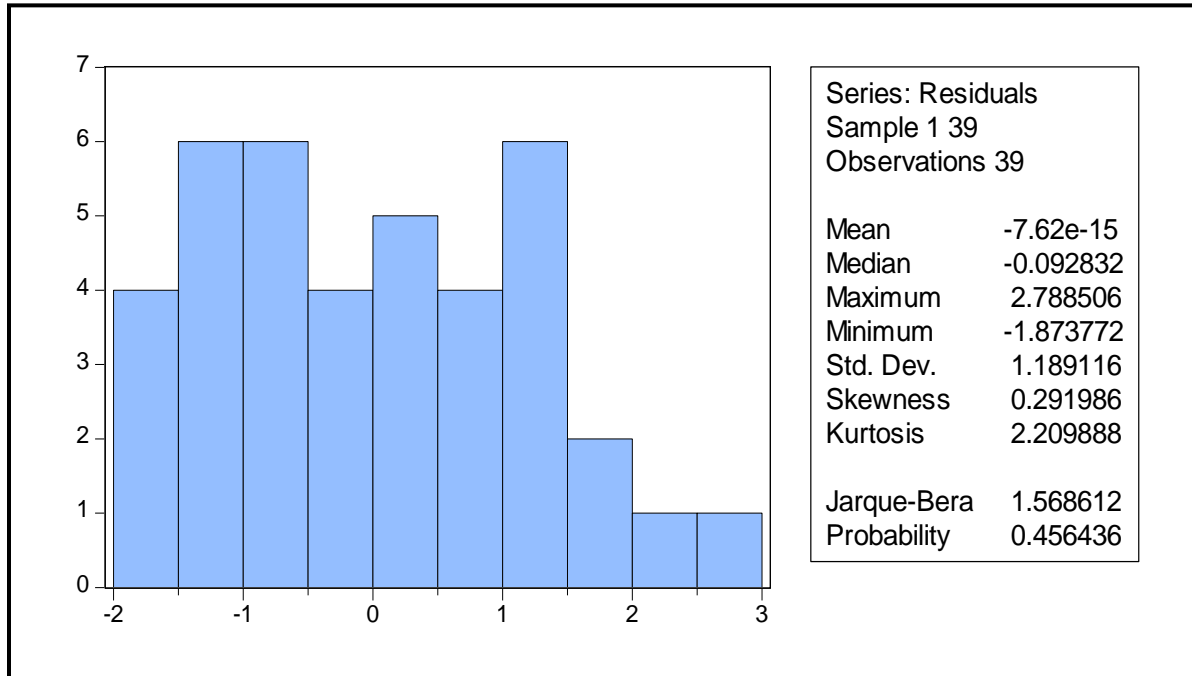
We can compute Jarque-Bera test statistic using the following rule:

$$JB = n[S^2/6 + (K-3)^2/24]$$

Where S represents skewness and K represents kurtosis. In our model, skewness and kurtosis values of residuals are 0.29 and 2.20 respectively. By using Jarque-Bera test computed  $JB = 1.57$ , which is less than the critical value of 5.99 at 5% level of significance with 2 df, Which

shown in figure-2. We also fail to reject the null hypothesis on the grounds that  $0.456 > 0.05$ . So this model does not violate the normality assumption.

**Figure-2: Jarque –Bera test estimation**



### Tests for Heteroskedasticity

Homoskedasticity is an important property for OLS method. So it is important to find out whether there is any heteroskedasticity problem or not. To test heteroskedasticity, we have used the “Breusch–Pagan–Godfrey Test”.

### The “Breusch–Pagan–Godfrey Test”

Here the null and alternative hypotheses are;

Ho: There is no heteroskedasticity

Ha: There is heteroskedasticity problem

The formula of the Breusch-Pagan-Godfrey test shows as follows:

$$\chi^2 = N \cdot R^2 \sim_{asy} \chi^2_{(s-1)}$$

Where  $\chi^2$  shows chi-square distribution with (s-1) degrees of freedom

Our observed  $\chi^2 = 2.93$ . Now, we find that for 3 df and 5% level of significance, critical  $\chi^2 = 7.815$  and the 1% critical  $\chi^2 = 11.345$ . Thus the observed  $\chi^2 = 2.93$  is not significant at 1% as well as 5% level of significance. So the model is free from heteroskedasticity problem (According to appendix-5).

### Test for Autocorrelation

In order to conduct Durbin-Watson test statistic, following assumptions must be satisfied:

- 1) It is necessary to include a constant term in the regression.
- 2) The explanatory variables are non-stochastic, in repeated sampling.
- 3) The disturbance terms  $U_t$  are generated by the first order auto-regressive scheme.
- 4) The regression model does not include lagged values of the dependent variable as one of the explanatory variables.
- 5) There are no missing observations in data.
- 6) The error term  $U_t$  is assumed to be normally distributed.

In the absence of software that computes a p-value, a test known as the bounds test can be used partially overcome the problem of not having general critical values. Durbin & Watson considered two other statistics  $d_L$  &  $d_U$  whose probability distribution do not depend on the explanatory variables and which have the property that

$$d_L < d < d_U$$

That is, irrespective of the explanatory variables in the model under consideration will be bounded by an upper bound  $d_U$  and 0 a lower bound  $d_L$ . If  $d < d_L$ ,  $H_0$  is rejected and  $d > d_U$  is not rejected. Our regression model is qualified by all these assumptions. So, we can use Durbin-Watson test. The test procedure is as follows:

$H_0: \rho=0$  (No auto correlation)

$H_a: \rho \neq 0$  ( auto correlation)

For this model, we have estimated  $d = 1.24$ , against for  $n=39$ ,  $k=3$  and  $\alpha=5\%$ , the  $d_L = 1.328$  and  $d_U = 1.658$ . Here 5% significance level,  $d_U = 1.658$  and estimated  $d = 1.24$ . So we can reject  $H_0$  because of  $d < d_U$ . That is statistically significant evidence of positive autocorrelation. (According to Appendix-3)

For reducing this problem, we can apply "Cochrane-Orcutt" iterative procedure to estimate  $\rho$ , where,  $\rho$  is known as the coefficient of auto-covariance. After that we can have a conclusion with the help of EGLS technique.

### Tests for Multicollinearity: Correlation matrix

Multicollinearity is a sample phenomenon; we don't have a unique method of testing multicollinearity. For detecting multicollinearity in our model, we use E-VIEWS.

Correlation matrix is one of the best techniques to detect multicollinearity. Now let's have a look at the following correlation matrix.

Table-7: Correlation matrix

	<b>MKTSZ</b>	<b>TRDBLN</b>	<b>LBRPRD</b>
MKTSZ	1.000000	-0.946181	0.873459
TRDBLN	-0.946181	1.000000	-0.818964
LBRPRD	0.873459	-0.818964	1.000000

According to the Table-7, it can be seen that some variables are highly correlated with one another. Particularly, the correlated co-efficient between MKTSZ and LBRPRD, These values are .873, respectively suggesting that the variable pair is highly correlated which are greater than 0.8. That is multicollinearity problem exists in this model.

So we can see, several of these pair-wise correlations are quite high, suggesting that there may be a several collinearity problem. Of course, remember the warning given earlier that such pair-wise correlations may be sufficient but not a necessary condition for the existence of multicollinearity.

## CONCLUSIONS AND POLICY IMPLICATIONS

Foreign direct investment (FDI) is a powerful weapon of economic development especially in the current global context. It enables a capital poor country like Bangladesh to build up physical capital, create employment opportunities, develop productive capacity, enhance skills of local labor through transfer of technology and managerial proficiency and help integrate the domestic economy with the global economy.

By recovering the gap between domestic savings and investments and by enhancing technical knowledge spread out, FDI can play important role in industrial development and economic growth in Bangladesh. Although most of the developing countries have been taking measures to attract FDI, but only a few countries are doing well in attracting FDI inflow.

One of the objectives of this study was to find out the determinant of foreign direct investment inflows in Bangladesh. In order to ascertain the determinants of FDI, this study undertakes an econometric study based on time series data for Bangladesh for the period of 1972-2010. The results from the co-integration tests reveal that FDI in Bangladesh and all its potential determinants have a long-run relationship, because all independent variables are co-integrated with FDI in our model.

The major determinants of FDI in Bangladesh are market size as measured by real GDP (MKTSZ), Trade Balance (TRDBNL) and labor productivity (LBRPRD), but MKTSZ and TRDBLN are found to be statistically significant in the original model.

Based on empirical findings, it is suggested that Bangladesh should try to improve or expand its market size, and improve labor productivity by giving institutional and vocational education among the mass people for attracting more FDI into the country. The importance of FDI cannot be overstated. As a result the investment climate in the country must be improved through appropriate measures.

- Crating more transference in the trade policy and more flexible and setting a suitable regulatory framework and tariff structure.
- Developing the port (Chittagong and Khulna) network, road network, railways and telecommunications facilities etc.
- Particular reforms measures are needed in the administrative system. Bureaucratic control and interference in business and investment activities should be minimized.
- As a developing country Bangladesh should maintain a good relation with the developed as well as the developing countries for receiving significant share of total FDI.
- Finally, political risks and instability must be reduced for raising the confidence of foreign investors. Opposition can play a vital role in that context.

## **FURTHER RESEARCH**

The simple model we developed in this study may suffer from a number of shortcomings. Therefore, some venues for future research may be considered. They are as follows:

This study uses annual time series data, which may mask some important dynamic aspects. An analysis based on quarterly or monthly data should certainly be more enriching. But availability of monthly data for Bangladesh would continue to be a major stumbling block at least in the foreseeable future. An important driving force of future research in time series analysis is the advance in high-volume data acquisition. Examples are: transaction-by-transaction data common to financial markets or communications networks, and in e-commerce on the internet. These data will be available in future and must be processed properly and efficiently. But the special features of the data, such as large sample sizes, heavy tails, unequally spaced observations, and mixtures of multivariate discrete and continuous variables, can easily render existing methods inadequate. Analyses of these types of data will certainly influence the directions of future research.

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## APPENDICES

### Appendix-1

Null Hypothesis: X1 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.340535	0.1651
Test critical values:		
1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X1)

Method: Least Squares

Date: 09/13/12 Time: 13:58

Sample (adjusted): 2 39

Included observations: 38 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
X1(-1)	-0.190159	0.081246	-2.340535	0.0249
C	0.454515	0.229615	1.979463	0.0555
R-squared	0.132072	Mean dependent var		0.230199
Adjusted R-squared	0.107963	S.D. dependent var		1.361865
S.E. of regression	1.286250	Akaike info criterion		3.392535
Sum squared resid	59.55982	Schwarz criterion		3.478724
Log likelihood	-62.45817	Hannan-Quinn criter.		3.423201
F-statistic	5.478104	Durbin-Watson stat		2.661677
Prob(F-statistic)	0.024915			

Null Hypothesis: X2 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	2.063217	0.9998
Test critical values:		
1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X2)

Method: Least Squares

Date: 09/13/12 Time: 13:59

Sample (adjusted): 2 39

Included observations: 38 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
X2(-1)	0.010009	0.004851	2.063217	0.0464
C	-0.027997	0.035314	-0.792803	0.4331
R-squared	0.105743	Mean dependent var		0.044706
Adjusted R-squared	0.080902	S.D. dependent var		0.014921
S.E. of regression	0.014305	Akaike info criterion		-5.605205
Sum squared resid	0.007367	Schwarz criterion		-5.519016
Log likelihood	108.4989	Hannan-Quinn criter.		-5.574540
F-statistic	4.256866	Durbin-Watson stat		2.059047
Prob(F-statistic)	0.046360			

Null Hypothesis: X3 has a unit root

Exogenous: Constant

Lag Length: 8 (Automatic based on SIC, MAXLAG=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	3.913058	1.0000	
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X3)

Method: Least Squares

Date: 09/13/12 Time: 14:01

Sample (adjusted): 10 39

Included observations: 30 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
X3(-1)	0.505225	0.129113	3.913058	0.0009
D(X3(-1))	-0.936438	0.311341	-3.007757	0.0070
D(X3(-2))	-0.863662	0.287798	-3.000932	0.0071
D(X3(-3))	-0.950463	0.318597	-2.983277	0.0073
D(X3(-4))	-1.393826	0.319589	-4.361314	0.0003
D(X3(-5))	-1.106956	0.343223	-3.225183	0.0042
D(X3(-6))	-0.520393	0.404564	-1.286306	0.2130
D(X3(-7))	-0.951679	0.336119	-2.831381	0.0103
D(X3(-8))	-0.620661	0.375281	-1.653859	0.1138
C	-12.28862	5.841219	-2.103777	0.0483
R-squared	0.613789	Mean dependent var	-11.27967	
Adjusted R-squared	0.439994	S.D. dependent var	23.22127	
S.E. of regression	17.37730	Akaike info criterion	8.809408	
Sum squared resid	6039.413	Schwarz criterion	9.276474	
Log likelihood	-122.1411	Hannan-Quinn criter.	8.958827	
F-statistic	3.531685	Durbin-Watson stat	2.117122	
Prob(F-statistic)	0.008989			

Null Hypothesis: X4 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-0.904673	0.7759
Test critical values:		
1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(X4)

Method: Least Squares

Date: 09/13/12 Time: 14:02

Sample (adjusted): 2 39

Included observations: 38 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
X4(-1)	-0.058435	0.064592	-0.904673	0.3717
C	0.304932	0.313201	0.973597	0.3368
R-squared	0.022229	Mean dependent var		0.023220
Adjusted R-squared	-0.004931	S.D. dependent var		0.206453
S.E. of regression	0.206961	Akaike info criterion		-0.261374
Sum squared resid	1.541987	Schwarz criterion		-0.175186
Log likelihood	6.966112	Hannan-Quinn criter.		-0.230709
F-statistic	0.818434	Durbin-Watson stat		2.268148
Prob(F-statistic)	0.371653			

## Appendix-2:

Null Hypothesis: RESID01 has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic based on SIC, MAXLAG=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.196985	0.0021
Test critical values:		
1% level	-3.615588	
5% level	-2.941145	
10% level	-2.609066	

\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(RESID01)

Method: Least Squares

Date: 09/22/12 Time: 06:56

Sample (adjusted): 2 39

Included observations: 38 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
RESID01(-1)	-0.639770	0.152436	-4.196985	0.0002
C	0.033056	0.181132	0.182494	0.8562
R-squared	0.328542	Mean dependent var		0.028360
Adjusted R-squared	0.309891	S.D. dependent var		1.344067
S.E. of regression	1.116554	Akaike info criterion		3.109568
Sum squared resid	44.88096	Schwarz criterion		3.195756
Log likelihood	-57.08179	Hannan-Quinn criter.		3.140233
F-statistic	17.61468	Durbin-Watson stat		2.073906
Prob(F-statistic)	0.000169			

### Appendix-3

Dependent Variable: X1

Method: Least Squares

Date: 09/21/12 Time: 20:24

Sample: 1 39

Included observations: 39

	Coefficient	Std. Error	t-Statistic	Prob.
C	-54.33731	8.664915	-6.270957	0.0000
X2	7.855486	1.463339	5.368191	0.0000
X3	0.015921	0.005533	2.877393	0.0068
X4	0.023645	0.778855	0.030359	0.9760
R-squared	0.792695	Mean dependent var		1.255591
Adjusted R-squared	0.774926	S.D. dependent var		2.611676
S.E. of regression	1.239031	Akaike info criterion		3.363450
Sum squared resid	53.73189	Schwarz criterion		3.534072
Log likelihood	-61.58728	Hannan-Quinn criter.		3.424668
F-statistic	44.61111	Durbin-Watson stat		1.244543
Prob(F-statistic)	0.000000			

## Appendix-4

Ramsey RESET Test:

F-statistic	3.997118	Prob. F(1,34)	0.0536
Log likelihood ratio	4.334842	Prob. Chi-Square(1)	0.0373

Test Equation:

Dependent Variable: X1

Method: Least Squares

Date: 09/22/12 Time: 06:53

Sample: 1 39

Included observations: 39

	Coefficient	Std. Error	t-Statistic	Prob.
C	-53.01255	8.342520	-6.354502	0.0000
X2	7.538728	1.413350	5.333942	0.0000
X3	0.011065	0.005840	1.894895	0.0666
X4	0.255552	0.756453	0.337829	0.7376
FITTED^2	-0.098899	0.049467	-1.999279	0.0536
R-squared	0.814502	Mean dependent var	1.255591	
Adjusted R-squared	0.792679	S.D. dependent var	2.611676	
S.E. of regression	1.189161	Akaike info criterion	3.303583	
Sum squared resid	48.07954	Schwarz criterion	3.516860	
Log likelihood	-59.41986	Hannan-Quinn criter.	3.380105	
F-statistic	37.32271	Durbin-Watson stat	1.247555	
Prob(F-statistic)	0.000000			

## Appendix-5

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.948192	Prob. F(3,35)	0.4279
Obs*R-squared	2.931423	Prob. Chi-Square(3)	0.4023
Scaled explained SS	1.428238	Prob. Chi-Square(3)	0.6989

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 09/22/12 Time: 06:46

Sample: 1 39

Included observations: 39

	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.405270	10.75853	-0.037670	0.9702
X2	-0.525982	1.816911	-0.289493	0.7739
X3	0.004787	0.006870	0.696813	0.4905
X4	1.270495	0.967042	1.313796	0.1975
R-squared	0.075165	Mean dependent var		1.377741
Adjusted R-squared	-0.004107	S.D. dependent var		1.535255
S.E. of regression	1.538405	Akaike info criterion		3.796284
Sum squared resid	82.83411	Schwarz criterion		3.966905
Log likelihood	-70.02753	Hannan-Quinn criter.		3.857501
F-statistic	0.948192	Durbin-Watson stat		1.985584
Prob(F-statistic)	0.427924			