Does FDI intensify Economic Growth? Empirics from Bangladesh.

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1. Introduction

Foreign direct investment (FDI[†]) in developing countries especially in Bangladesh takes a vibrant part of GDP acceleration and rapid economic growth (Motaleb 2007). Empirically, FDI inflow emerges export-oriented sectors that enhanced the sectoral economic growth (Alam 1999 and Hossain 2008) and infrastructure development as well as employment generating activities. Indeed, FDI inflow affects by some important determinants like as GDP per capita, average growth rate of GDP, foreign reserve, gross capital formation, human capital, terms of trade and others essential infrastructure. FDI inflows to Bangladesh have increased dramatically in recent years and have had some positive influence on development (BOI 2008).

Empirical evidence between FDI and economic growth is ambiguous (Jyun-Yi and Chih-Chaing 2008) although, various research studies dispute about positive and significant impact in explaining the function of FDI. Mian and Alam (2006) and Borensztein et al. (1998) also explore the similar causal relationships for long-term economic growth. Delali Accolley (2007) has critically discussed the empirical investigations on the effects of some macroeconomic variables such as GDP growth, market size, and degree of openness, real effective exchange rate, and labor cost on flows of FDI into the USA has been estimated. Kabir (2007) also investigated about FDI and sustainable growth of Bangladesh, where inflows of foreign investment can expand economic production and growth.

Entire analyses will examine correlations of causal factors that exist between FDI and general development predictors to support the conceptual theory. This paper has examined the relationship between FDI and GDP using time series data during 1970-2006 time periods from the Bangladeshi economy. In focusing on the history of FDI in Bangladesh, the article will render an overview of the diverse policy measures the monetary authority of Bangladesh (GoB) has implemented since the country's independence in late 1971 (Kabir 2007). Until 1985, GNP per capita did not manage to grow nearly as fast as other low income countries. In trying to overcome the stifled growth, outside pressure from foreign donors induced the government to privatize major industries and adopt economic reforms of local investment policies as a means to attract more FDI and boost economic growth. Causal factors that have influenced FDI will also be emphasized, as like as policy changes, overvalued exchange rates, financial risks, political stability, and tax liabilities as exogenous. Overall, the purpose of this study is to analyze the determinants of FDI and economic growth nexus as well as the relationship either positive or negative.

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[†] World Investment Report 2006 defines, "FDI is an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor (FDI enterprise or affiliate enterprise or foreign affiliate)."

2. The Model

The purpose of this empirical investigation is to test five hypotheses that are economic growth, market size, degree of openness, exchange rate, and labor cost as determinants of inward FDI.

(2.1) $FDII = \gamma_0 GDPC + \gamma_1 GDPAGR + \gamma_2 TO + \gamma_3 LFGR + \gamma_4 WR + \mu$

Where, FDII, GDPC, GDPAGR, TO, LFGR, WR and μ stand respectively for the inward flows of FDI (Current US$), the GDP (Current US$), the annual percentage of GDP growth rate, the trade openness, the labor force growth rate, the wage rate and the error term.

The regressors GDPAGR and GDP are not only determinants of FDI inflows but as well endogenous variables explained by FDI inward flows (FDII) and other exogenous variables such as technological change, education per worker, growth in labor input, gross fixed capital formation, etc. Biased as well as inconsistent estimates will be obtained if the response between FDI inflows and GDPAGR or GDP is not considered to estimate the covariates of relation (2.1). Equation (2.1) can be written as (2.2) and (2.3).

(2.2) $\Delta GDPC = \delta_0 FDII + \delta_1 \Delta GCF + \delta_2 \Delta EPC + \delta_3 \Delta RFE + \delta_4 \Delta TLCS + \varepsilon$

(2.3) $GDPC = \delta_0 FDII + \delta_1 GCF + \delta_2 EPC + \delta_3 RFE + \delta_4 TLCS + \varepsilon$

Where, GDPC, FDII, GCF, EPC, RFE, TLCS and ε are the GDP (current US$), gross capital formation (% of GDP), electric power consumption (KWh per capita), reserve foreign exchange (at the end of the period US$), telephone line and cellular subscribers and stochastic error term. Relation (2.2) enables to test the effects of FDI inflows, GCF, EPC, RFE and TLCS on economic growth.

Most notably, GDPC is a stationary variable, but FDII is not. Regressing GDPC on FDII will be meaningless if GDPC is I (0) and FDII is I (1) or I (2). A way of dealing with this problem is to consider in equation (2.2) GDPC as a function of ΔFDII and not FDII. This is equivalent to 2.1. Equation (2.1) combined with relation (2.3) suggest that economic growth in a recipient country is both a determinant and an effect of FDI inflows. To sum up, two structural equations make up the FDI model that is going to be estimated.

(2.4a) $FDII = \gamma 1\ GDPC + \gamma_2 GDPAGR + \gamma_3 TO + \gamma_4 LFGR + \gamma_5 WR + \mu$

(2.4b) $GDPC = \delta 1\ FDII + \delta_2 GCF + \delta_3 EPC + \delta_4 RFE + \delta_5 TLCS + \varepsilon$

The endogenous (jointly determined) variables of the model are FDII and GDPC (and consequently GDPAGR), whereas TO, LFGR, WR, GCF, EPC, RFE and TLCS are treated as exogenous or predetermined variables.

One of the assumptions underlying the estimation of a single equation by OLS is that the regressors in the model are independent and uncorrelated with the error term (Gujarati, 1995,

p. 65). If it occurs then the estimated parameters will be biased and inconsistent. In the first equation of model (2.4a), the regressor GDP is correlated with the error term μ. A random increase in μ will result in an increase in FDI inflows (FDII) and then in an increase in GDPC. Thus, GDPC and μ move in the similar path, i.e. cov (GDPC, μ) > 0. In the second equation (2.4b), the explanatory variable FDII is also correlated with the stochastic disturbance ε. If ε increases, GDPC will go up and so will FDII. It reveles that model (2.4b) cannot be estimated by OLS. Some alternative estimation procedure like as indirect least squares (ILS), instrumental variable (IV) method, two-stage least squares (2SLS) method, and vector autoregression (VAR) model generally used to minimize the problem. In the study, instrumental variable method is employed to estimate equation (2.4).

2.1 Test of Time Series Stationary with ADF test

A random time series Y_t is said to be stationary (assume weakly stationary) if 'its means and variance are constant over time and the value of covariance between two time periods depends only on the distance between the two time periods and not on the actual time at which the variance is computed' (Gujarati, 1995, p. 714). Tests based on relation (2.8) or (2.9) are called Augmented Dickey-Fuller (ADF) unit root tests because of the introduction of lags of the regressand as repressors to get rid of serial correlation. To test whether a time series Y_t is stationary or not, one of the above relations is estimated the following hypotheses are then formulated.

$$\text{Ho: } \delta = o \rightarrow \rho = 1$$

$$\text{H1: } \delta < o \rightarrow \rho < 1$$

If the absolute value of τ statistic is less than the critical value for a given level of significance, the null hypothesis of non-stationarity is accepted. Otherwise, the alternative hypothesis of stationarity of Y_t is accepted. If it happens that Y_t is found to be non-stationary, another DF or ADF unit root test can be performed on its first difference ΔY_t. This is done by substituting Y_t by ΔY_t in relation and Y_{t+1} by ΔY_{t+1}. After that, a relation akin to or any of its variants is derived and estimated.

The stationarity of the data is tested and shown at table 3. FDII, GDPC, TO, LFGR, WR, GCF, EPC, and RFE are I (1). GDPAGR is I (0) and TLCS is I (2). The specification of model (2.4) will be reconsidered so that the variables in the model are I (1); this is a necessary condition for cointegration. So the model is

(2.5a) $FDII = \gamma_0 + \gamma_1 GDPC + \gamma_2 GDPAGR + \gamma_3 TO + \gamma_4 LFGR + \gamma_5 WR + \mu$

(2.5b) $GDPC = \delta_0 + \delta_1 FDII + \delta_2 GCF + \delta_3 EPC + \delta_4 RFE + \delta_5 \Delta TLCS + \varepsilon$

In model (2.5), all the variables are I (1) except GDPAGR and the intercept terms which are stationary. The specification of the model can again be modified. In the first equation of model (2.5), cointegration will be tested for, first, between I (1) variables, i.e. FDII, GDPC, TO, LFGR, and WR. If these variables are found to be cointegrated, then their residuals will be cointegrated with GDPC. The new specification of model (2.5) is:

(2.6a) $FDII = \gamma_1 GDPC + \gamma_3 TO + \gamma_4 LFGR + \gamma_5 WR + \mu_1$

(2.6b) $GDPC = \delta_1 FDII + \delta_2 GCF + \delta_3 EPC + \delta_4 RFE + \delta_5 \Delta TLCS + \varepsilon$

Where,

(2.7) $\mu_1 = \gamma_0 + \gamma_2 GDPAGR + \mu_1$

The estimation method used in the paper, as said the two stage least square (2SLS).

2.2 The 2SLS Procedure

The first is to estimate by OLS the reduced form equation of all the endogenous variables appearing in the right-hand side of model (2.6). In the first structural equation of model (2.6), GDPC is the endogenous variable appearing on the right-hand side. In the second equation, FDII is the endogenous variable appearing on the right-hand side. The reduced form of the equation of an endogenous variable expressed as a linear combination of all the pre-determined variables in the model.

(2.8) $FDII = \alpha_0 + \alpha_1 TO + \alpha_2 LFGR + \alpha_3 WR + \alpha_4 GCF + \alpha_5 EPC + \alpha_6 RFE + \alpha_7 \Delta TLCS + \mu$

(2.9) $GDPC = \beta_0 + \beta_1 TO + \beta_2 LFGR + \beta_3 WR + \beta_4 GCF + \beta_5 EPC + \beta_6 RFE + \beta_7 \Delta TLCS + \eta$

The second stage of the 2SLS is the substitution of the endogenous variables on the right-hand side of model (2.6) by the fitted values obtained from their reduced form equations. In the first equation of model (2.6), GDP will be replaced by the fitted values obtained from relation (2.9) and in the second equation FDII will be replaced by the fitted values obtained from estimating relation (2.8).

3. Empirical Results

Empirically, the constant term of the study α_0 and β_0 are expected to be positive, as autonomous investment and natural economic growth. Contemporary theory suggests that economic boom in a country appeals to foreign investors. This seems to explain most of FDI inflow (FDII) into the South Asian countries. But, it is - 5484.96 that give negative influence with FDII in Bangladesh whereas β_0 at GDPC model is positively related as theory predict.

The parameter (α_1) captures the influence of the degree of trade openness (TO) of the host country on the flows of FDI it receives. The trade to GDP ratio, i.e. exports plus imports over GDPC is often used to proxy the degree of trade openness. This ratio suggests how a country is being integrated into the new economic order over time period. There is no a priori to make about the sign of the parameter α_1. In the estimated model it is positively related with FDII of Bangladesh.

Labor force growth rate (α_2) have depends on industrial infrastructure established on domestic market. Export processing zones (EPZ) gives an opportunity to increases employment rate that also enhances inward FDI. In Bangladesh perspective, it shows positive impact on FDII.

The sign of the parameter α_3 depends on the level of development of the host country considered. Wag rate or cheap labor cost explains the flows of FDI into some developing economies such as Bangladesh. High labor cost explains divestments from LDC. α_3 is therefore expected to be negative in the Bangladesh. The estimated parameter is negative for Bangladesh perspective as there are some institutional barriers to implement efficient wage rate in manufacturer sector. Gross capital formation (GCF) or capital formation in domestic economy enhances internal investment as well as external FDII. The estimated parameter (α_4) value also predicts the assumption.

Electric power consumption (EPC), foreign exchange reserve (RFE), telephone line and telecommunication subscribers (TLCS) are theoretically show positive relation on FDII. Our prediction about α_5, α_6 and α_7 also support this empirically.

4. Conclusions

Over the article, each FDI component were separated to examine them as independent economic factors before evaluating their connection with each other. The history of Bangladesh exemplifies the plethora of factors that have shaped the country, particularly through reforms in economic policy and public management. The investment regime has undergone a complete transformation via privatization and trade liberalization. These factors have allowed the country to adapt in an increasingly interdependent with global economy, and Bangladesh has successfully reaped many benefits of foreign investment.

The conclusion of the econometric analysis may be misleading especially as regards the causality within the relationship. The positive relationship can lead some people to believe that FDI generates economic growth. But study finds that it is other way round that instead growth is a significant determinant of FDI. It is economic growth that attracts FDI. The argument rests on the fact that foreign investors invariably prefer to invest not only in large markets but also in economies which are experiencing ongoing high rates of economic growth. A large inflow of FDI can add to foreign exchange and investment resources in a host economy but it may deter the development of local firms or create exchange rate problems.

Therefore, FDI is pivotal in providing Bangladesh the necessary finance and capital to achieve sustainable growth as well as poverty alleviation. Statistical analyses are used to exemplify the essential function of foreign investment in maintaining the economic growth. FDI inflows have been able to increase GDP by raising the economy's output capacity and employment level. At the same time, it has also delivered development by improving people's per capita income.

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Appendices

Figure 1: Inward FDI (FDII) Trend in Bangladesh (1975-2006)

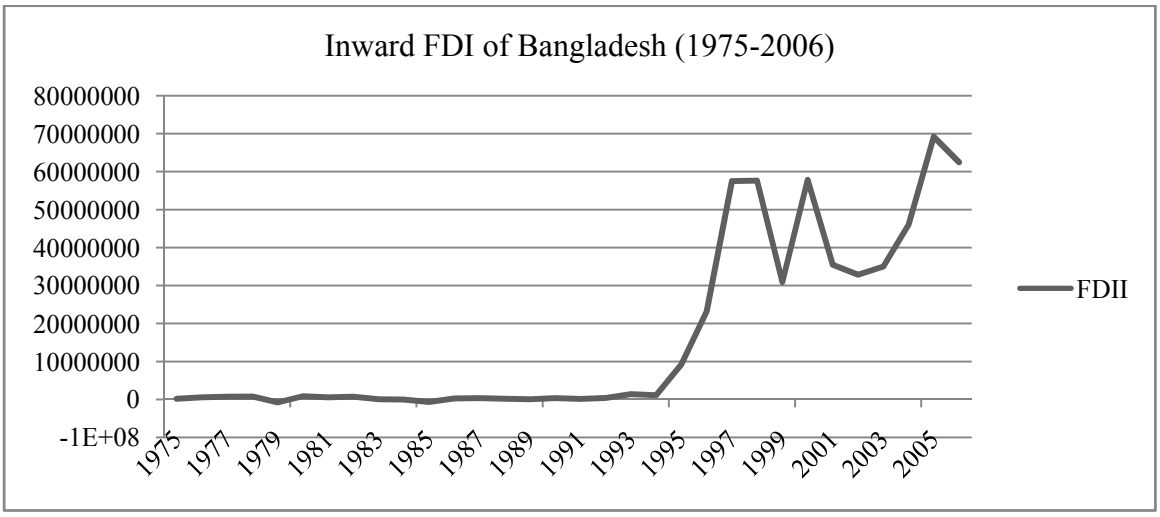

Table 1: 2SLS Model Variables

Variable	Description
FDII	Inward flows of Foreign Direct Investment (Current US$)
GDPC	Gross Domestic Product (Current US$)
GDPAGR	Annual percentage of GDP growth rate
TO	Trade openness
LFGR	Labor force growth rate
WR	Wage rate (National threshold)
GCF	Gross capital formation (% of GDP)
EPC	Electric power consumption (KWh per capita)
RFE	Reserve foreign exchange (At the end of the period, US$)
TLCS	Telephone line and cellular subscribers

Data Sources: WDI, UN Data, UNCTAD, BOI, BBS.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FDII	32	164000000	237000000	-8010000	692000000
GDPC	32	32000000000	15000000000	9630000000	61900000000
GCF	32	17.8846	4.5527	6.1479	24.6506
RFE	32	1260000000	1040000000	130000000	3800000000
TO	32	13.3616	10.5383	1.0297	37.1203
LFGR	32	0.0335	0.0630	-0.0696	0.2855
EPC	32	59.0248	39.0735	15.3304	139.3253
TLCS	32	1131067	2692616	60000	12100000
WR	32	0.8597	0.5964	0.1154	2.0488

Table 3: Ratios from ADF Unit Root Tests of Time Series Variables

Variable	Trend shows	Use ADF with	ADF test with constant (Intercept)			ADF test with constant & time trend			Integrated of order
			Level	1st Difference	2nd Difference	Level	1st Difference	2nd Difference	
FDII	No	C	-0.719956	-6.287198	NA	-	-	-	I(1)
GDPC	Yes	C & TT	-	-	-	-1.501971	-6.954677	NA	I(1)
GDPAGR	No	C	-7.902078	NA	NA	-	-	-	I(0)
TO	Yes	C & TT	-	-	-	0.055971	-6.390764	NA	I(1)
LFGR	No	C	-3.184557	-7.165297	NA	-	-	-	I(1)
WR	Yes	Ct & TT	-	-	-	-1.161646	-4.586705	NA	I(1)
GCF	No	C	-2.674235	-4.583105	NA				I(1)
EPC	Yes	C & TT	-	-	-	0.357965	-4.568306	NA	I(1)
RFE	No	C	-0.075836	-4.194755	NA	-	-	-	I(1)
TLCS	No	C	-1.806488	6.511646	7.837953	-	-	-	I(2)

Note: C and TT stands for Constant and Time Trend.

Table 4: 2SLS Estimation of the Models

Category Variables	FDII Model			GDPC Model		
	Coef.	Std. Err.	t	Coef.	Std. Err.	t
TO	5812.16		1.67	1995.87		0.03
LFGR	5067.63		0.48	13856.27		0.24
WR	- 12847.93*		-1.72	52426.95		1.28
GCF	1557.22		1.02	15024.09*		1.79
EPC	- 4837422		-0.42	7035.06		1.01
RFE	- 0.0084068		-0.15	1.790796		1.62
TLCS	86.83		1.70	- 1725.088		-1.68
Cons.	- 5484.96		- 1.04	26497.08		0.91
R-square	0.82			0.98		
Adjusted R-square	0.76			0.97		

Note: Dependent variable: FDII at model FDII; GDPC at model GDPC.
***, **,*: Significant at 1%, 5% and 10% level.