On The Causal Links between Foreign Direct Investment and Economic Growth in Bangladesh, 1975-2010: An Application of Granger Causality and Co-Integration Techniques.

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Abstract:

Purpose: Foreign direct investment is an imperative to overcome deficiencies in capital formation and to gain market access in the present context of liberalization of the world economy. So, the point of the paper is to unveil the relationship between foreign direct investment and economic growth in Bangladesh.

Design/methodology/approach: The paper examines the long-run relationship between per capita income (GDP), and foreign direct investment in Bangladesh during the period 1975–2009. Here, the Granger causality and Johansen co-integration techniques are employed to analyze the relationship and direction of causality between the variables. The Johansen co-integration statistic indicates that the variables are co-integrated, and the granger causality statistic reveals a unidirectional causality running from foreign direct investment to economic growth.

Findings: It is found that income and foreign direct investment are co integrated in the long run. There are strong evidence for unilateral causality running between income and foreign direct investment in the long-run. Hence, the findings of this study have policy implications for Bangladesh where measures for increasing foreign direct investment can be relevant in policymaking.

Keywords: Foreign Direct Investment, Economic Growth, Granger Causality, Johansen co-integration.

Introduction:

Foreign Direct Investment (FDI) contributes to economic growth of one country as the external factor. Currently FDI becomes an important variable in fastening the economic growth not only for developing countries but also for developed countries (Agosin and Mayer, 2000). One of the most striking features of trade openness since the beginning of the 1980s in developing countries was the inflow of private capital in the form of FDI (Sahoo, 2006). Since then, FDI inflows have been considered as one of the important sources of economic growth in developing countries (Agrawal, 2000). Though the gains from FDI inflows are unquestionable as it contributes to economic growth through an increase in productivity by providing new investment, better technologies and managerial skills to host countries (Balasubramanyam et al. 1996), however, the effect of FDI on domestic investment is an issue of concern as there is a possibility of displacement of domestic capital due to competition from foreign investors with their superior technologies and skills (Alexiou and Tsaliki, 2007). Thus it is a challenge for developing countries to find out the appropriate direction of the role of FDI and economic growth. There are findings which support that FDI tends to promote economic growth of the Less Developed Countries (LDC) (Blomstrom et al. 1994). The transfer of new techniques and technology spill over from the subsidiaries of multinational to domestic firms and enhances economic growth. On the other hand, others found that FDI follow economic growth (Waheed,2004). Economic growth first provides necessary and conducive economic factors for FDI to play a positive role for economic development (Zhang, 2002). For example, the spill over effect of technology transfer through FDI can only be successful if the absorbing capacity of host countries is developed. In this regard, understanding the causal relationship between economic variables is very important because it provides useful information on the variables of government and agencies (Melina Dritsaki et al.2004). FDI and economic growth may be linked in one of the three possible ways. Firstly, if causality is found from economic growth to FDI, it means that economic growth is a prerequisite for attracting and absorbing FDI (Abdus Samad, 2009). In this case, government would employ policies that accelerate economic growth in order to encourage foreign investment inflows. Secondly, causal link perhaps run from FDI to economic growth (Ram, 1987). In this case, it leads to the belief that FDI not only leads capital formation and employment generation but also provides economic growth to host countries. The policy implication in this case, suggests that corporate rules and

regulations of host countries must address to attract FDI. Finally, causal relation may run in both ways (Nair-Reichert and Weinhold, 2001). If the causal link is bidirectional, then both economic growth and FDI have reinforcing effects on each other.

Bangladesh has been turning into the most generous FDI recipient country in South Asia despite having a number of impediments, such as poor infrastructure, scarcity of power supply, political instability, poor law and order situation etc. have been able to make the country a centre of attention of the overseas investors Razzaque et al. (2001). Until the 1980s, Bangladesh was skeptical of the intentions of FDI and considered it as tools for promoting foreign interest. FDI inflows have risen during the period 1980-1990 and it went up about $1090 million in 2008, (Table 1).
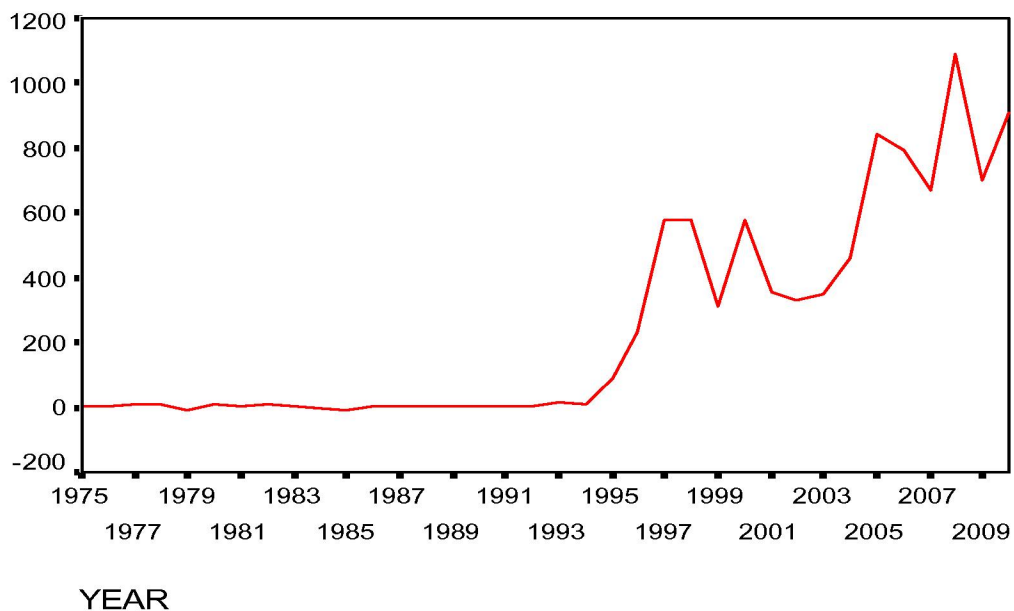
Constructed from UNCTAD, Major FDI indicators (WIR 2009)

Table 1: Trend of FDI Inflows in Bangladesh

The Board of Investments of Bangladesh has been playing a significant role to make Bangladesh the most favorable FDI region by offering convenient facilities and promotion of investments to the overseas investors. According to UNCTAD (2011), the sharpest rise in FDI inflows occurred during the period of 1995-1997. In the fiscal year 2005-2008, Bangladesh became the most liberalized investment regime in the South Asian region. However, the empirical studies on the direction of causality between

variables remain scanty. Therefore, the objective of this study is to investigate the causality relationship between FDI and economic growth in Bangladesh using time series data over the period 1975- 2010. This paper is motivated by a number of factors. First, there is a lack of other published studies dealing with the causal links between FDI and economic development (as measured by GDP per Capita) in Bangladesh and investigating the whole period 1975-2010. Secondly, it enriches the existing literature focusing on the causality analysis of FDI on the dynamics of growth measured by GDP per capita. Thirdly, it covers a period, which includes some of the most important political, social and economic transformations leading to a more integrated therefore more globalize Bangladesh economy. The plan of the paper is as follows: Section 2 briefly presents the literature. Section 3 presents the data and methodology employed. Analysis and empirical results in Section 4 and Section 5 presents concluding remarks.

Literature Review

During the last two decades a large number of studies focused on the role of FDI in stimulating economic growth in the LDC. The considerable increase in FDI, especially in developing countries as of 1990s has led to emergence of some ideas that focus on the growth dynamics that are measured by Gross Domestic Product (Pan, 2003). As a result, the complex relationship between FDI and economic growth resulted in a large number of empirical studies in developed and developing countries. In the literature regarding the causal links between FDI and economic growth, De Mello (1997) showed that the rate of growth of FDI inflows as a share of GDP in selective countries of Southeast Asia and Latin America has outpaced exports as a share of GDP over the period from 1980 to 1994. Borensztein, Gregorio and Lee (1998) found that FDI contributed economic growth to countries when the labor force has attained certain level of educational standard. Hansen and Rand (2006) found strong causal link from FDI to GDP for a group of 31 developing countries during (1970-2004). Ilhan Ozturk and Huseyien Kalyoncu (2007) examined the effect of FDI on economic growth of Turkey and Pakistan during 1975-2004 periods. The authors employed both Engle- Granger co-Integration and Granger causality techniques to analyze the direction of causality between FDI and economic growth. The econometric results indicated that it is GDP that causes FDI in the case of Pakistan, while bi-directional causality was reported between the variables for Turkey. Ericsson and Irandoust (2001) calculated the cause and effect relationships

between FDI and economic growth by using the data collected from four OECD countries (Denmark, Finland, Norway and Sweden) in 2001. The researchers failed to find a causality relationship for Denmark and Finland and they claimed that the reason for this was the unique dynamics and nature of FDI in these countries. Furthermore, Chakraborty and Basu (2002) examined the causality between FDI and output growth in India. Utilizing annual data from 1974-1996, they found that the real GDP in India is not Granger-caused by FDI and the causality runs from real GDP to FDI. Carkovic and Levine (2002) scrutinized the effect of FDI on economic growth and calculated that FDI had no impact on long term economic growth. They argued that the lack of positive impact of FDI on economic growth is not conditional upon human capital, level of economic development or openness of the economy. Similarly Wang (2002) tried to explore which types of FDIs contribute economic growth considerably. Within the context of the study, he used the data between 1987-1997 fiscal years from 12 Asian countries and suggested that manufacturing FDIs have positive impact on economic growth and this positive effect is due to spillover effect of FDIs. Moreover, Liu, Burridge and Sinclair (2002) tested the existence of a long run relationship among economic growth, FDI and trade in china. Using a Co-integration framework with quarterly data for exports, imports, FDI and growth from 1981 to 1997, the research found the existence of a bi-directional causal relationship among FDI, growth and exports. Makki and Somwaru (2004) used the data from 66 countries classified in three decades (1971-80, 1981-90, and 1991-2000). This study was extended replication of Borenzstein's analysis in a way to include 1990s as well. The results showed no significant differences between these two empirical studies. It has been found that FDIs affect economic growth to a large extent together with foreign trade, human capital and domestic capital and finally FDI has direct or indirect positive effects on economic growth. Frenkel, Funke and Stadmann (2004) examined the mutual effects of pushing and pulling factors in developed countries with FDI outflows and developing countries with FDI inflows. 22 countries and 1990- 2002 fiscal year data was used in this study and it was found that as the GDP increase rate is getting higher in developing countries with FDI inflows, FDI volume is also increasing. Kholdy and Sohrabian (2005) found no causal link between FDI and economic growth. Chowdhury and Mavrotas (2006) found relationship of bidirectional causality between FDI and economic growth. Sridharan et al. (2009) analyzed the causal link between FDI and economic growth among BRICS countries. The results revealed a bi directional causal relationship between growth and FDI for

Brazil, Russia and South Africa while unidirectional causality runs from FDI to growth in the case of India and China. In Nigeria, Olusegun Omisakin et al (2009) investigated causal and long run relationships among FDI, trade openness and growth between 1970 and 2006. The results indicated that a unidirectional causality runs from FDI to output growth.

Kumar and Pradhan (2002) investigated the relationships between FDI, economic growth and domestic investment for a sample of 107 developing countries between 1980 and 1999. The causality tests showed that where as the direction is not clear for most countries, causality runs from economic growth to FDI in a considerable number of countries. Zhang (2001) examined 11 countries of Asia and South Africa and found no uniform pattern of direction with regard to FDI and economic growth. Hermes and Lensink (2003) examined role of financial system of 67 countries and concluded that the development of financial system was an important factor for FDI to have a positive impact on economic growth. Causality between FDI and economic growth had not seemed to be valid for some countries. One of the studies on this issue was conducted by Frimpong and Oteng-Abayie (2006), who examined the causality between FDI and economic growth in Ghana based on the data covering 1970-2002 fiscal years. Causality test done for two different periods (1970-1983 and 1984-2002) produced conflicting results for the period mentioned. Thus the empirical evidence on the causal link between FDI and economic growth is mixed that deserves fresh enquiry into the issue.

Methodology & The Model:

The present study employs data that consist of annual observations during the period 1975-2009 to avoid the seasonal biases. Furthermore, Hassapis et al. (1991) noted that cointegration is a long run concept and thus requires long spans of data to give the tests for cointegration more power than merely increasing the data frequency. All data are obtained from the World Bank (WDI) database and are transformed into logarithmic returns in order to achieve mean reverting relationships and to make econometric testing procedures valid.

Finally, the econometric software, namely Microfit 4.1 and Eviews 5.1 are used to complete the analysis in this study.

The model intends to establish the relationship between foreign direct investment and national income of Bangladesh where it can be expressed in the following basic bivariate model.

$$Y_t = \alpha + \beta F_t + \varepsilon_t \qquad (1)$$

Where, Y_t is real gross domestic product (GDP) and F_t is the Foreign Direct Investment and ε_t is white noise. Logarithmic transformation of the above equation and inclusion of a trend variable would leave the basic equation as follows

$$LY_t = \alpha_0 + \alpha_1 t + \beta FE_t + \varepsilon_t \qquad (2)$$

where, t is the trend variable.

While conducting an econometric study, the direction of causal relationship among variables is determined according to the information obtained from the theory. Classical regression analysis is based on the assumption that the method used is correct and the direction of the causality is determined in the model. Therefore, in this study Granger causality test will be used in order to test the hypothesis regarding the presence and direction of causality between FDI and economic growth. In order to apply Granger causality test, the series that belong to variables should be stationary. Therefore, it is necessary to make test for unit roots to examine whether the series for these two variables are stationary or not.

The standard Granger causality test (Granger, 1969) seeks to determine whether past values of a variable helps predict changes in another variable. In the context of this analysis the Granger method involves the estimation of the following equations:

$$LY_t = \beta_0 + \sum_{i=1}^{q} \beta_{1i} LY_{t-i} + \sum_{i=1}^{q} \beta_{2i} LF_{t-i} + \varepsilon_{1t} \qquad (3)$$

$$LF_t = \varphi_0 + \sum_{i=1}^{r} \varphi_{1i} LF_{t-i} + \sum_{i=1}^{r} \varphi_{2i} LY_{t-i} + \varepsilon_{2t} \qquad (4)$$

where, LYt and LFt represent real GDP and Foreign Direct Investment, respectively, ε_{1t} and ε_{2t} are uncorrelated stationary random process, and subscript t denotes the time period. Failing to reject $H_0 : \beta_{21} = \beta_{22} = ... = \beta_{2q} = 0$ implies that Foreign Direct Investment do not Granger cause real income activities. On the other hand, failing to reject $H_0 : \varphi_{21} = \varphi_{22} = ... = \varphi_{2r} = 0$ implies that real GDP do not Granger cause Foreign Direct Investment.

Empirical works based on time series data assume that the underlying time series is stationary. However, many studies have shown that majority of time series variables are nonstationary or integrated of order 1 (Engle and Granger, 1987). The time series properties of the data at hand are therefore studied in the outset.

The above specification of the causality test assumes that the time series at hand are mean reverting process. However, it is highly likely that variables of this study are nonstationary. Formal tests will be carried out to find the time series properties of the variables. If the variables are I (1), Engle and Granger (1987) asserted that causality must exist in, at least, one direction. The Granger causality test is then augmented with an error correction term (ECT) as shown below:

$$\Delta LY_t = \beta_0 + \sum_{i=1}^{q} \beta_{1i} \Delta LY_{t-i} + \sum_{i=1}^{q} \beta_{2i} \Delta LF_{t-i} + \alpha_1 Z_{t-1} + \varepsilon_{1t} \tag{5}$$

$$\Delta LF_t = \varphi_0 + \sum_{i=1}^{r} \varphi_{1i} \Delta LF_{t-i} + \sum_{i=1}^{r} \varphi_{2i} \Delta LY_{t-i} + \lambda_1 Z_{t-1} + \varepsilon_{2t} \tag{6}$$

where Z_{t-1} is the ECT obtained from the long run cointegrating relationship between real GDP and Foreign Direct Investment. The above error correction model (ECM) implies that possible sources of causality are two: lagged dynamic regressors and lagged cointegrating vector. Accordingly, by equation (5), Foreign Direct Investment Granger causes real GDP, if the null of either $\sum_{i=1}^{q} \beta_{2i} = 0$ or $\alpha_1 = 0$ is rejected. On the other hand, by equation (6), real GDP Granger causes Foreign Direct Investment, if λ_1 is significant or $\sum_{i=1}^{r} \varphi_{2i}$ are jointly significant. Real output and Foreign Direct Investment granger cause each other i.e. presence of bidirectional causality), if causality exists in both directions.

Results and discussion

Table 2 reports the descriptive statistics for the sample of two variables under investigation. Overall calculations indicate that GDP and FDI are not normally distributed and are characterized as leptokurtic and skewed.

	GDP	FDI
Mean	3.884557	8.704907
Median	3.922462	8.811030
Maximum	4.491337	9.728750
Minimum	3.157563	7.380211
Std. Dev.	0.349487	0.580046
Skewness	-0.308467	-0.683098
Kurtosis	2.353133	2.490166
Jarque-Bera	0.987118	3.284203
Probability	0.610450	0.303497
Observations	35	35

Table: 2 Descriptive Statistics
Note: LY: Log of real GDP; LF: Log of Foreign Direct Investment

Table 3 displays the estimates of the ADF unit root test in levels and in first differences of the data with an intercept, with an intercept and trend and with no intercept or trend. The co-integration test among the variables that are used in this research requires previously the test for the existence of unit root. The tests have been performed on the basis of 1 percent significance level, using the McKinnon Critical Values. The minimum values of the Akaike (AIC) statistics have provided the better structure of the ADF equations. According to these calculations the null hypothesis of a unit root in the time series cannot be rejected at 1 percent level of significance in variable levels and for all three types of ADF procedure. However, when the data sets are transformed into their first differences, all types of ADF test results imply that GDP per capita and FDI are both stationary. So, these variables are integrated of order one i.e. I (1).

	Test with Intercept		Test with Intercept & Trend		Test with no Intercept or Trend	
	Levels	1st Difference	Levels	1st Difference	Levels	1st Difference
FDI	-3.0747	-5.6595	-3.2104	-5.5907	1.5771	-5.2709
GDP	-0.8376	-4.7359	-3.8841	-4.4711	-2.2429	-2.9415
C.V.*	-3.6104	-3.6267	-4.4212	-4.2350	-2.6308	-2.4487

Table 3: Augmented Dickey- Fuller Unit Root Test Results
*Mckinnon Critical Value at 1 percent significant level.
The lag length was determined using Akaike Information Criterion (AIC)

Since it has been determined that the variables under examination are integrated of order one, the co-integration test is performed. Table 4 provides the results from the application of Johansen co-integration test among the data sets. Evidence show that both the maximum eigen value and the trace tests reject the null hypothesis of no co-integration at the one percent significance level according to critical value estimates. So,

these results suggest that the number of statistically significant co-integration vectors is equal to one.

Date: 02/03/2012		Sample (adjusted): 1975 2010		
Series: FDI RGDP Lags Interval: 1 to 1				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics	5 percent Critical value	1 percent Critical value
None **	0.423063	20.58740	15.41	20.04
At most 1*	0.169098	5.186800	3.76	6.65
*(**) denotes rejection of the hypothesis at 5%(1%) level Trace test indicates 2 co integrating equation(s) at the 5% level Trace test indicates 1 co integrating equation(s) at the 1% level				
Hypothesized No. of CE(s)	Eigenvalue	Max – Eigen Statistics	5 percent Critical value	1 percent Critical value
None **	0.423063	15.40060	14.07	18.63
At most 1*	0.169098	5.186800	3.76	6.65
*(**) denotes rejection of the hypothesis at 5%(1%) level Max-Eigen test indicates 2 co integrating equation(s) at the 5% level Max-Eigen test indicates no co integration at the 1% level				

Table 4: Results of Johansen co-Integration test

After determining that the selected macroeconomic variables are co-integrated, the Granger-causality analysis is examined to find the causal links between the variables under examination. As a testing criterion the F-statistic was used. Table 5 reports the estimations of the Granger causality tests. The outcome of the Granger causality tests is shown in Table 4. Results of the Granger-causality test showed that the null hypotheses of FDI does not Granger-cause GDP per capita is rejected in 1 and 2 year lags, at the 5% and the 10% levels, respectively. On the other hand, the null hypotheses of GDP does not Granger-cause FDI is not rejected. This leads to the conclusion that there is only a one-way causality running from FDI to GDP.

F - Statistics				
Null Hypothesis	Lag 1	Lag 2	Lag 3	Lag 4
FDI does not Granger–cause GDP per Capita	10.4221**	6.1223*	0.0021	0.5225
GDP per Capita does not Granger-cause FDI	0.142271***	0.9212***	1.8272	0.3996
* Reject the null hypothesis at the 10 percent significant level.				
** Reject the null hypothesis at the 5 percent significant level.				
*** Reject the null hypothesis at the 1 percent significant level.				

Table 5: Granger Causality Test results

Concluding Remarks and Policy Implications:

This study examines the relationship between FDI and GDP per capita in the economy of Bangladesh, using the methodology of Granger causality and Johansen co-Integration test.

Strong evidence emerges that the economic growth as measured by GDP in Bangladesh is Granger-caused by the FDI. This means that there is a unidirectional causality running from FDI to GDP. There is no evidence that the causality link between FDI and GDP is bi-directional in Bangladesh. Bangladesh appears to harbor the most systematic foreign investment regime in South Asia, especially since the beginning of 1990s, due to various facilitating steps taken to attract FDI. Since the mid-1980s, Bangladesh was one of the frontrunners in implementing trade related reforms and measures in this regard which included a significant decline in quantitative restrictions, opening up of trade in many restricted items, rationalization of import tariffs, and liberalization of the foreign exchange regime. As a result, Bangladesh has been successful in maintaining a considerable level of economic growth over the years. The results of this study also reflect the outcomes of the abovementioned reform measures. The results clearly indicate that FDI causes economic growth in the perspective of Bangladesh. It is also found that FDI has a dynamic and positive impact on the domestic investment of Bangladesh with positive and dynamic impact of domestic investment itself. Thus the respective authorities ought to put efforts in encouraging more FDI inflows to Bangladesh and review the existing policies in liberalizing trade.

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