Bangladesh Journal of Political Economy

Vol. 31, No. 5, January 2017, pp. 263-290
Bangladesh Economic Association
(ISSN 2227-3182)

An Empirical Analysis of Investment, Trade Openness and Economic Growth in Bangladesh: 7th Five Year Plan Perspective

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Abstract: *Investment is the emotive force for economic growth. FDI complement's the process of attaining the saving investment gap by supplying foreign capital while trade openness maintains an important channel for country's investment and the economic growth. This paper, attempts to find out the impact of domestic investment, FDI and trade openness on economic growth and their causalities in Bangladesh. It undertakes sample of 42 annual observations covering the period of 1972 to 2013.To attend the objectives a disaggregated econometric analysis has been carried out in this paper. The instability index for each of the variables is higher during pre-liberalization than that of the post-liberalization period (1990). The variables of the function have been found non-stationary at their levels but they all stationary after the first difference.That is, they are integrated of order one I(1).The cointegration test confirms that there are 2 (two) long run cointegrated stable relationships between pair wise labour, domestic investment, FDI, trade openness and economic growth in Bangladesh. The OLS estimated coefficients of the growth function indicate that domestic investment positively affects GDP by 70 percent while the impact of labour is also positive but insignificant. GDP of Bangladesh is negatively influenced by FDI and trade openness but they are insignificant. This may be due to their insignificant contribution To The domestic economy of Bangladesh. VECM confirms that there is short run dynamics to the long run equilibrium between domestic investment and GDP growth while a long run causality but with a divergence relation exists among stock of labour, FDI, trade openness and growth in Bangladesh. VAR result shows that the long run significant elasticities exist among stock of labour (negative), domestic investment (positive) and GDP growth while the short run significant but negative elasticities exist among stock of labour, FDI and GDP growth. Granger Causality test shows that there are short run bidirectional causalities between stock of labour and the GDP growth otherwise, unidirectional*

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causality exists in Bangladesh. From the findings of the study, it has been imperative for the government of Bangladesh to formulate policy to create more avenues towards the capital formation through instigating national savings for domestic investment. The constraints regarding inward FDI inflows should be abolished. The export-led growth policy should be improved for favourable external balance. But, the first emphasis should be given on the enhancement of domestic investment.

1. Introduction

Investment is considered asthe nucleus for the economy. It is viewed as beneficial to employment creator-as it brings about economic growth and economic development in the long run. It can be termed as capital flowing from a firm or individual within the country or in one country to a business or businesses in another country involving a share of at least 10%. Investment is generally classified into four major components: the private domestic investment, the public domestic investment, the foreign direct investment and the portfolio investment. Private domestic investment refers to gross fixed capital formation plus net changes in the level of inventories whereas; public investment includes investments by the government of a country and public enterprises on social and economic infrastructure, real estate and tangible assets. The combination of private and public investment is normally referred to as gross fixed capital formation while the tangible asset is referred to as direct foreign private investment. Foreign private capital flows come in two forms: equity and debt. The largest of all capital flow (long term investment with management control) to developing countries is called FDI. Portfolio equity includes direct purchases of shares by foreign investors as well as share purchases through country funds and depository receipts. The distinction between equity and debt flows is that with equity, capital is repatriated only when an investment is profitable (Perkins et al., 2001, pp. 522-523).The issue of economic prosperity is often linked to domestic investment i.e. the gross internal capital formation of a country, massive inflow of FDI into a nation, and the impact of FDI through trade openness (the ratio of export and import to GDP) on economic growth. Many researchers have conducted studies to investigate the fundamental theories of domestic investment, FDI, various influential macroeconomic variables, the impact of economic integration on the movements of FDI and the benefits and costs of FDI in developing countries (Yusop, 1992; Jackson and Markowski, 1995; Cheng and Yum, 2000; Lim and Maisom, 2000). Most of them agree that there exists a positive causal relationship between FDI and economic performance, either in the short run or in the long run, or both. Diversified relationships exist between domestic investment and FDI. FDI helps to overcome capital shortage in the host countries and complements domestic investment when FDI flows to high risk areas or new industries where domestic investment is limited (Noorzoy, 1979). When, FDI occurs in resource industries, domestic investment related industries may be

stimulated. Moreover, FDI is believed to be a pulsating implement for the growth of the income and employment, technological advancement, socio-economic development parallel to improve income distribution or poverty reduction especially for the developing countries of the world like Bangladesh. The nexus of domestic investment, FDI, and trade openness in promoting economic growth has been the subject of much debate among development specialists, researchers, aid donors as well as recipients in Bangladesh in particular. In spite of this, there are only few empirical studies that investigate the interrelationships of domestic investment, FDI, trade openness and economic growth in Bangladesh. This paper however, tries to assess the impact of and the nexus among domestic investment, FDI, trade openness on economic growth in Bangladesh.

2. Review of the Literature

This paper has reviewed the existing literatures related to the topic. **Alfaro, et al.** (2000) finds that FDI may reduce the savings and thus, less domestic investment which may result in the reduction in growth. **Ghosh and Hendrik** (2006) focus on how foreign direct investment (FDI) transfers technology from developed economies to less developed economies. FDI is found to have a significant, positive and economically important impact on U.S. growth. **Rahman and Shahbaz** (2011) investigate the effects of imports and foreign capital inflows on economic growth in Pakistan and found the long run relationship between foreign capital inflows and economic growth while foreign capital inflows have positive and significant effect on the economic growth in Pakistan. **Ahamed and Fahian** (2010) state that FDI inward to the middle-income countries has the evidence for export-oriented manufacturing sector as a major stimulus to the economic growth. It has a positive spillover and significant impacts on economic growth in Bangladesh. **Miao** (2009) states that FDI in manufacturing sector has a significant and positive effect on economic growth in the host economies while FDI inflows in non-manufacturing sectors do not play a significant role in enhancing economic growth. **Chakraborty and Nunnenkamp** (2008) assess that FDI stocks and output are mutually reinforcing in the manufacturing sector whereas, any causal relationship is absent in the primary sector. **Shujie and Kailei** (2006) present that FDI is a mover of production efficiency reducing the gap between the actual level of production and a steady state production frontier. **Alguacil et al.** (2005) observe the mixed findings in the FDI-growth nexus. **Akinlo** (2004) investigates the impact of FDI on economic growth in Nigeria, for the period 1970–2001. He found that both private capital and lagged foreign capital have small, and not a statistically significant effect, on the economic growth. **Choong et al.** (2004) investigate that the presence of FDI inflows creates a positive technological diffusion in the long run only if the evolution of the domestic financial system has achieved a certain minimum level. **Borensztein et al.** (1998) test the effect of FDI on economic growth that FDI is an important vehicle for the transfer of technology, contributing relatively more to

growth than domestic investment. **Shahbaz** (2012) investigates effect of trade openness on economic growth. The results confirm that trade openness promotes economic growth in the long run. **Zambe and Yue** (2010) found a long run relationship between FDI, trade openness and outputwhereas, unidirectional causal relationship running from FDI, trade openness to output and from output, FDI to trade openness in Cote d'Ivoire. **Yucel** (2009) examines that trade openness has a positive effectand the presence of bi-causal relationship between financial development, trade openness and growth. **Metwally** (2004) develops a simultaneous equations model to test the process of interaction between FDI, exports and economic growth in three Middle Eastern countries: Egypt, Jordan and Oman.He found that interest rate differentials exert a much stronger effect than economic growth on the attraction of foreign capital in the case of Egypt. **Hye** (2011) constructs a financial development index (FDI) for the Indian economy. He found that longrun relationship is presentamong the economic growth, FDI, real-interest rate (RIR), labor force and capital. But, FDI is negatively associated with economic growth. **Tang et al.** (2008) investigate the causal link between FDI, domestic investment and economic growth in China for the period 1988-2003. He found that there is a bi-directional causality between domestic investment and economic growth while there is only single-directional causality from FDI to domestic investment and to economic growth. **Kim and Seo** (2003) provide empirical evidence on the dynamic relationship between inward FDI, economic growth and domestic investment in Korea. They find that FDI has some positive but insignificant effects on economic growth. **Hossain and Kamal** (2012) found that there is no co-integration between FDI and GDP in both long and short run in Bangladesh and India while the co-integration between them in Pakistan. Conversely, there is no causality between GDP and FDI for Bangladesh and uni-directional relationship is found for Pakistan and India. **Shafiun et al.** (2009) attempt to find the long run cointegratedrelationships between FDI and economic growth for Bangladesh. They find that FDI and GDP are not cointegrated while FDI and openness are not significantly causing the GDP both in the short and long run. **Islam et al.** (2005)observe that there is a uni-directional causal relationship running from economic growth to investment in Bangladesh. **Adhikary** (2012) investigates the impact of FDI, trade openness, domestic demand, and exchange rate on the export performance of Bangladesh. He does not trace any significant causal relationship for the cases of trade openness, domestic demand, and exchange rate.

3. Objective and Methodology

From the above background, this paper is guided by the following specific objectives:

i) to examine the current states of domestic investment, FDI, trade openness and economic growth in Bangladesh;

ii) to assess the impact of domestic investment on economic growth in Bangladesh;

iii) to assess the impact of FDI inflows in Bangladesh on economic growth;

iv) to assess the impact of trade openness in Bangladesh on economic growth;and

v) to examine the causal relationships between domestic investment, FDI, trade openness and economic growth in Bangladesh.

Methodology

The data for this paper have basically been collected from the secondary sources, those are: the Statistical Yearbook of Bangladesh, Bangladesh Economic Review of various years, Bangladesh Economic Survey, and Economic Indicators of Bangladesh Bank. Data of this paper have been obtained majorly from the World Development Indicators (WDI) of World Bank database and the Direction of Trade Statistics (International Monetary Fund). Other sources of data have also been used for the requirement of the estimations. Since, all the relevant variables are the macroeconomic in nature; the secondary data are obviously required to estimate the functions. The variables that have been used are: GDP proxy of economic growth, stock of labour, domestic investment proxy for domestic capital formation, FDI and trade openness.The collected data have frequently been transformed into logarithmic and generated in accordance with the requirement of the time series econometric analysis. Analyses of trends and characteristics of investment, foreign transactions and in national income (GDP) have been made mainly in terms of constant data based on 2005. This is done for avoiding the inflationary effect in the data. The area of this study is the whole country with the disaggregated level discussion of domestic investment, FDI, trade openness and economic growth. The sample of this study has covered forty two (42) annual observations (1972-2013).

Model Specification

Standard growth models have at their core one or a series of production functions. At the national or economy wide level, production functions describe the relationship of the country's labour force and its stock of capital with the level of that country's gross national product. In this case, the Neoclassical (Solow growth model), Endogenous (Romer growth model) and Aggregate Production Function (APF) growth models have been used to attend the objectives and estimating the regression function.

Econometric Estimable Growth Function

On the basis of the objectives, this paperaims to assess the impact of domestic investment, FDI, trade openness on economic growth and their short and long run

causal relationships. In this context, this paper tries to form the following estimable regression function for Bangladesh with only systematically affecting variables.The aggregate production function (APF) which includes FDI and other relevant variables in the modeling is used which is widely supported by the literature (Feder, 1983; Fosu, 1990; Herzer,2010;Kohpaiboon, 2004; Mansouri, 2005; Ukpolo, 1994; Fosu and Magnus, 2006) and it assumes, along with traditional input of production-labor and capital, other unconventional input like FDI, trade openness which can be influential to growth. Following Fosu and Magnus's (2006) APF model which is based on Cobb-Douglas production function using logarithmic in both sides:

$$\ln y_t = c + \alpha \ln l_t + \beta \ln di_t + \delta \ln fdi_t + \phi \ln to_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (6.3.1)$$

Where, all variables are as defined and c is constant term and is white noise error term; α, β, δ, and φ are expected to be positive. From the equation (6.3.1), y is defined as real domestic product per capita, *l* is labor force proxy of active population age group (15 to 65), k is real gross capital formation per capita, as data of fixed capital is not available for Bangladesh, gross capital formation has been used as a proxy of domestic investment (*di*), fdiis the foreign capital inflows in the country to percentage of GDP, to is the ratio of the sum of export and import values to the GDP. The data of the variables of GDP function has been transformed into natural logarithms because,the coefficients of the cointegrating vector can be interpreted as long runelasticities; the log first difference can be interpreted as growth rates; it reduces the heteroscedasticity problem from the model; andthe log data tends to be stationary.

Econometric Designs

In order to attend the objectives and to test the hypotheses improved econometric analytical techniques with up to date available data have been carried out throughout this paper. The econometric procedure of thispaper thus proceeds as:**First,** as the pre-estimation techniques, the procedures, the nature of the data distribution have been examined successively. ***One,*** the standard descriptive statisticsare to be analyzed with the summary statistics. ***Two***, if a time series contains trend, seasonality or some other systematic components, the usual summary statistics can be seriously misleading and should not be calculated.In the k-variable regression model, we shall have in all *k(k-1)*/2 zero-order correlation coefficients. These *k(k-1)*/2 correlations can be put into a matrix, called the correlation matrix R (Gujarati, 2012, pp. 937-938). Where, the subscript 1, denotes the dependent variable Y (r_{12} means correlation coefficient between Y and X_2 and so on) and where use is made of the fact the coefficient of correlation of a variable with respect to itself is always 1 ($r_{11} = r_{22} = \ldots\ldots = r_{kk} = 1$). In this way the correlation among domestic investment, FDI, trade openness and GDP growth are to be examined.***Three,***there is one assumption of chosen CLRM that one should like to

check, namely, the normality of the disturbance termutthat is,thet and F tests used before require that the error term follow the normal distribution. The J-B test of normality is an asymptotic, or large-sample, test. It is also based the OLS residuals. The test first computes the skewness and kurtosis measures of the OLS residuals.The value of the J-B statistic is expected to be 0. If the computed p value of the J-B statistic in an application is sufficiently low, which will happen if the value of the statistic is very different from 0, one can reject the hypothesis that the residuals are normally distributed. But the *p* value is reasonably high, which will happen if the value of the statistic is close to zero, the normality assumption will not be rejected (Gujarati, 2012, pp. 147).***Four,*** generally time series data suffers from structural break problem. The Chow test is essential for long run time series to identify parameter stability over the period of investigation. In this study, the period is broken by two sub-periods such as pre liberalization (1972-1990) and post liberalization (1991-2013). Therefore, the Chow test is very much appropriate to apply to test the parameter stability. The structural change can be measured by the two intercepts or two slopes of the models in pre-liberalization and post-liberalization periods. The Chow test is simply the F-test.If the value of computed F-statistic is greater than the critical value then we reject the null hypothesis (there is no significant change in the time series data between two periods) of structural stability is rejected, otherwise accepted (Maddala, 2001, pp. 173). Five, the pattern of stability of time series data during both periods (pre and post-liberalization) as well as overall study is measured by the Coppock's Instability Index (1962). The coppock Instability Index thus, can be measured them by the following algebraic formula:

$$CII = [Anti\log(\sqrt{\log v - 1})] \times 100 \quad \text{..... (6.4.1)}$$

Second, any time series data is said to be stationary if its mean and variance are constant over time and the value of the covariance between two-time series does not depend on the actual time at which the covariance is computed (Gujarati, 1995). On the other hand a series is non-stationary if it fails to satisfy any of the conditions, i.e. its mean, variance or covariance change overtime. The time series tend to exhibit non-stationary stochastic process is in the following form:

$$Y_t = \delta + \rho Y_{t-1} + u_t \quad \text{..... (6.4.2)}$$

Where, δ is a constant, u_t is the stochastic error term. If the coefficient of Y_{t-1}, in fact equal to 1 ($\rho = 1$). Then, Y_t is said to have unit root. In other words, Y_t could be characterized as having a unit root and a drift (random walk with a drift. The time series property of each variable is investigated under a univariate analysis by implementing the ADF (Augmented Dickey- Fuller), D-F (GLS), PP test and the correlogram test for the unit root (non-stationarity) problem. ***One,*** the Augmented Dickey-Fuller test is used to test for the existence of unit roots and determine the order of integration of the variables. The tests are done both with and without a

time trend. Akaike method is used to choose the optimal lag length, which is found to be 1 for all variables. The presence of a unit root problem which indicates non-stationarity, cannot be rejected for levels of the variables at the 5% significance level. It may be also found in the first difference. However, the non-stationarity problem then may be vanished after second difference and so on. The ADF test however, requires modifying as:

$$\Delta Y_t = \delta_1 + \delta_2 t + \zeta Y_{Yt-1} + \theta \sum_{i=1}^{m} \Delta Y_{t-1} + u_t; \text{ i=1,2---------m.} \quad \text{..... (6.4.3)}$$

Where, u_t is assumed to be identical and independently distributed random variable. ***Two***, the D-F (GLS) t-test is performed by testing the hypothesis a0 = 0 in the regression:

$$\Delta y_t^d = \alpha_0 y_t^d + \alpha_1 \Delta y_{t-1}^d + \text{.....} + \alpha_\rho \Delta y_{t-\rho}^d + u_t \text{.....} \quad (6.4.4)$$

Where $yt^d$is locally de-trended series yt. The local de-trending depends on whether we consider a model with drift only or a linear trend. Thus the DF-GLS test is the popular solution to the problem of size distortions and low power of unit root tests. If the critical value of DF-GLS test is lower than the calculated value, the null hypothesis of existence of unit root problem accepted otherwise rejected and the data series are non-stationary. But, the data series may be stationary in the first or second difference. The critical values of DF-GLS test are shown by Elliott et al. (1996) for a model with linear trend (Maddala, 2001, pp. 550-551). ***Three***,Phillips-Perron (1988) test is used to deal with serial correlation and hetero-scedasticity. An important assumption of the DF test is that the error term u'_t s is independently and identically distributed. The ADF test adjusts the DF test to take care of possible serial correlation in the error terms by adding the lagged difference terms of the regressand. The PP test is the t value associated with the estimated coefficient of ρ*. The series is stationary if ρ* is negative and significant. The test is performed for all the variables where both the original series and the difference of the series are tested for stationarity.***Four***, the non-stationarity of time series data can be tested by using autocorrelation function (ACF) based on the so-called Correlogram test. The ACF at lag k , denoted by ρk, is defined as:

$$\hat{\rho}_k = \frac{\gamma_k}{\gamma_0} = \frac{Co\,\text{var}\,iance}{Variance} = \frac{\sum (Y_t - \bar{Y})(Y_{t+k} - \bar{Y})}{n} = \frac{\sum (Y_t - \bar{Y})^2}{n} \text{.....} \quad (6.4.5)$$

Where, *n* is the sample size and $\bar{Y}$ is the sample mean. Bartlett (1946) has shown that if a time series is purely random that is, if it exhibits white noise, the sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n*, where *n* is the sample size. Following the properties of the standard normal distribution, the 95 percent confidence interval for any $\hat{\rho}_k$ will be, $\pm 1.96(1/n)$. Thus, if an estimated $\hat{\rho}_k$ falls inside the interval , $(-1.96(1/n), +1.96(1/n))$ the hypothesis cannot be rejected that the true $\hat{\rho}_k$ is zero. But, if it lies outside this confidence interval, the hypothesis can be rejected that the true is zero. If none of the estimated correlations lies in the interval, the estimated autocorrelation shown by the table will be statistically significant (Gujarati, 2011).**Third**, In the event of

the non-stationarity of each variable, the cointegrating relationship among variables (tendency for variables to move together in the longrun) is studied by the Johansen-Juselius procedure (Johansen 1988, Johansen-Juselius 1992, 1999) to overcome the associated problem of spurious correlation and misleading inferences. Johansen (1988) suggests a maximum likelihood procedure to obtain cointegrating vectors and speed of adjustment coefficient identifying the number of cointegrationvectors within the vector autoregressive (VAR) model. To identify the number of cointegration vectors, a likelihood ratio test of hypothesis is used. The following Vector Autogressive (VAR) model is the basis of multivariate cointegration of Johansen Maximum Likelihood approach:

$$Z_t = A_1 Z_{t-1} + - - - - - A_k Z_{t-k} + u_t \quad \ldots\ldots\ldots\ldots\ldots (6.4.6)$$

Here, Z_t is an (n x *1*) vector of *I (1)* variables including both endogenous and exogenous variables. A_t is an (n x n) matrix of parameters, u_t is (n x 1) vector of white noise errors. The equation (6.4.6) can be estimated by OLS because each variable is Z is regressed on the lagged values of its own and all other variables in the system. Since, Z_t is assumed to be non-stationary, it is convenient to rewrite (6.4.6) in its first difference or error correction form as:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + - - - - - + \Gamma_{k-1} \Delta Z_{tt-k+1} + \Pi Z_{t-k} + u_t \ldots\ldots\ldots\ldots\ldots\ldots \quad (6.4.7)$$

Where, $F_j = -(1 - A_1 - A_2 - - - - A_i), (i = 1 - - - - k - 1), and\ \Pi = -(1 - A_1 - A_2 - - - A_k)$

The specification (6.4.7) provides information about the short- run and long- run adjustments to the changes in Z_t by estimating Γ and Π respectively. Equation (6.4.6) differs from the standard first difference form of the VAR model by only the inclusion of the term ΠZ_{t-k}. This term shows about the long- run equilibrium relationship between the variables in Z_t. Information about the number of cointegrating relationship among the variables in Z_t is given by the rank of the number matrix Π. If the rank of the Π matrix r is $0<r<n$, there are liner combinations of the variables that are stationary. The matrix can be decomposed into two matrices α and β such that $\Pi=\alpha\beta$, where α is the error correction term and measures the speed of adjustment in $\Delta Z_t$and β contains r distinct cointegrating vectors. The cointegrating rank of the above matricsr, can be formally tested with the Maximum Eigenvalue test (λ max) and the Trace test (λtrace). Fourth,If the data series are cointegrated, the ordinary least squares (OLS) method has been applied for functional estimation by minimizing its error term with sum and squares method. For K-variable case, the prominent matrix technique is to be applied for the estimation of the function.In case of multiple regressions or the K variable regression model, the ordinary least squares (OLS) method can be written more compactly in matrix notation as:

$$y = X\hat{\beta} + \hat{u} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6.4.8)$$

Where, $\hat{\beta}$ is a K- element column vector of the OLS estimators of the regression

coefficients and where is an column vector n residuals. As in the two and three variable models, in the *k*-variable case the OLS estimators are obtained by minimizing the residuals that gives, $\hat{u} = y - X\hat{\beta}$; Thus, by simple calculation,

$$\hat{\beta} = (X'X)^{-1}X'y \quad \text{..... (6.4.9)}$$

Where, $(X'X)^{-1}(X'X) = I$ is an identity matrix of order$(k \times k)$. Equation (6.4.9) is a fundamental result of the OLS theory in matrix notation for the case multiple regression model. It shows the $\hat{\beta}$ vector can be estimated from the given data that provides the best linear unbiased estimator that is BLUE (Gujarati, 1995, pp. 287-288).The Wald testfor the multiple regression models to test the hypothesis $\beta_i = 0$, e use this test statistics with the corresponding partial r2 substituted in the place of the simple r^2. The test statistics has a χ^2 distribution with *d. f. k.* The Wald test has a χ^2-distribution with d. f. r. if the test statistics is significant at the level, rejecting the hypothesis of coefficient stability (Maddala, 2001, pp. 176-177). **Fifth**, the purpose of VECM model is to indicate the speed of adjustment from the short-run dynamics to the long-run equilibrium state. The model is specified as:

$$\ln gdp_t = \alpha + \lambda e_{t-i} + \sum_{i=1}^{n} \beta_i \ln l_{t-i} + \sum_{i=1}^{k} \delta_i \ln di_{t-i} + \sum_{i=1}^{r} \phi_i \ln fdi_{t-i} + \sum_{i=1}^{p} \varphi_i \ln to_{t-i} + \varepsilon_t \quad \text{.....(6.4.10)}$$

In this specification, the variables are cointegrated if the parameter (λ) of the error correction term is negative and statistically significant in terms of its associated-t value. In case of λ being positive and statistically significant, still there exists a long-run causality but with a divergence. **Sixth**,VAR methodology superficially resembles simultaneous-equation modeling in that it is considered several endogenous variables together. But each endogenous variable is explained by its lagged, or past, values in the model. In such models, some variables are treated as endogenous and some as exogenous or predetermined (exogenous plus lagged endogenous). The seeds of this model are shown in the Granger causality test.

The test involves estimating the following regressions on the basis of GDP and FDI for instance:

$$\ln gdp_t = \sum_{i=1}^{n} \alpha_i \ln fdi_{t-i} + \sum_{j=1}^{n} \beta_j \ln gdp_{t-j} + u_{1t} \quad \text{..... (6.4.11)}$$

$$\ln fdi_t = \sum_{i=1}^{m} \lambda_i \ln fdi_{t-i} + \sum_{j=1}^{m} \delta_j \ln gdp_{t-j} + u_{2t} \quad \text{..... (6.4.12)}$$

Where, it is assumed that the disturbances u_{1t} and u_{2t} are uncorrelated. The first equation postulates that current lngdp is related to past values of GDP itself as well as of FDI, and the second equation postulates a similar behavior for *lnfdit*. It is essentially, treated that GDP and FDI as a pair of endogenous variables. There are no exogenous variables in this system. This example is the illustrations of vector autoregressive model; the term autoregressive is due to the appearance of the lagged value of the dependent variable on the right-hand side and the term vector is due to the fact that are dealt with a vector of two (or more) variables (Gujarati, 1995, pp-746).

Seventh,Granger (1988) developed a test to check the causality between variables.

Granger causality examines to what extent a change from past values of a variable affect the subsequent changes of the other variable. In order to obtain the estimated residuals ϵt, the Granger models with a dynamic error correction are as follows:

$$\ln gdp_t = \alpha + \lambda e_{t-i} + \sum_{i=1}^{m} \gamma_i \ln l_{t-i} + \sum_{i=1}^{r} \phi_i \ln di_{t-i} + \sum_{i=1}^{p} \varphi_i \ln fdi_{t-i} + \sum_{i=1}^{q} \lambda_i \ln to_{t-i} + \varepsilon_t \ldots\ldots\ldots (6.4.13)$$

Where, Δ indicates the difference operator, ϵ implies nonzero serially independent random error terms, and λt-i is the lagged error correction term obtained from the longrun cointegrating relations between the variables. The F statistics are the Wald statistics for the joint hypothesis, no causal relationship. It means that, the null hypothesis is that X_t does not Granger cause Y_t and that X_t does not Granger cause X_t in case of two variable regression model for example. **Eighth**, just as an autoregression has a moving average representation, a vector autoregression can be written as a vector moving average (VMA) model as:

$$x_t = \mu + \sum_{i=0}^{\alpha} A^i{}_1 e_{i-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (6.4.14)$$

Where, $\mu = (\overline{yz})^i$ and the unconditional mean of x_i is μ . This equation is the VMA representation in that the variables are expressed in terms of the current and past values of the two types of shocks (i.e., e_{1t} and e_{2t}). The VMA representation is an essential feature of Sim's (1980) methodology in that it allows tracing out the time path of the various shocks on the variables contained in the VAR model. Impulse response analysis (IRA) is performed in this study by giving a shock of one standard deviation (± 2 S.E. innovations) to stock of labour, domestic investment proxy of capital formation, FDI, and trade openness to visualize the duration of their effects on the GDP growth rates of Bangladesh. **Ninth**, the variance decomposition analysis reveals that the variance of GDP growth is primarily caused by its own variance followed by the volume of stock of labour, domestic investment, FDI and trade openness. It is to be noted that the role of labour, domestic investment, FDI and trade openness in explaining the volatility of GDP growth is to be found to be more influential from the subsequent years. **Finally**,if the error term in one time period is correlated with the error term in the previous time period, there is first-order autocorrelation. Most of the applications in econometrics involve first rather than second- or higher-order autocorrelation. Two popular correcting autocorrelation methods are the B-G and the L-M test.***One***, to avoid some of the pitfalls of the Durbin-Watson d test of autocorrelation, statisticians Breusch and Godfrey have developed a test of autocorrelation.Assuming a regression model-where the error term u_t follows the ρ th order autoregressive, AR (ρ) schemes as:

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \text{------} + \rho_\rho u_{t-\rho} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (6.4.15)$$

Where, $\epsilon_t$is a white noise error term. This is simply the extension of the *AR(1)* scheme. This test is an alternative to the Q-Statistic for testing serial correlation.The null hypothesis of the B-G test is that there is no serial autocorrelation up to the specified number of lags. The number of observations multiplied by R2 is the Breusch-Godfrey test statistic.***Two***, in the multiple regression models to

test the hypothesis $\beta_i = 0$, we use this test statistics with the corresponding partial r2 substituted in the place of the simple r^2. We have to substitute the multiple R^2 in place of the simple r^2 or partial r^2 in the formula. The test statistics has a χ^2 distribution with *d.f. k.* The L-M test like Wald test has a χ^2-distribution with *d. f. r.* if the test statistics is significant at the level, rejecting the hypothesis of coefficient stability (Maddala, 2001, pp. 176-177).***Three***, to give some idea about White's heteroscedasticity corrected standard errors, the variances of $\hat{\beta}$ ofkvariable regression model with the variance of any partial coefficient is obtained as:

$$\text{var}(\hat{\beta}_i) = \frac{\sum \hat{w}^2{}_{ji}\hat{u}_i{}^2}{(\sum \hat{w}^2{}_{ji})^2} \quad \ldots\ldots\ldots (6.4.16)$$

Since $\hat{u}^2{}_i$ are not directly observable, White suggests the squared residual for each *i*. White has shown that (3) is a consistent estimator of (2), that is, as the sample size increases indefinitely (3) converges to (2). Where,$\hat{u}_i$are the residuals obtained from the *k* variable regression (Gujarati, 2012, pp. 439-440).***Four***,as the post estimation techniques, the CUSUM and CUSUMSQ tests are to be applied to obtain whether the data set have structurally broken or not. In general, the CUSUM (cumulative sum) and CUSUMSQ (CUSUM squared) tests can be used to test the constancy of the coefficients in a model. It is shown that the conventional CUSUM test for structural change can be applied to cointegrating regression residuals leading to a consistent residual-based test for the null hypothesis of cointegration. The tests are semi-parametric and utilize fully modified residuals to correct for endogeneity and serial correlation and to scale out nuisance parameters. By applying these tests in the data series, the results will be more reliable and robust.

4. Findings

Result of the Chow Test

Result of the Chow Testconfirms that there exists no structural breakpoint in 1990 in the series of GDP during the study period. Since, the calculated F-statistic is 3.94 which is greater than the F-critical value and it is also confirmed by the p-value equals to 0.007 which is much lower than any significance levels (α). The p-valuesare very small so the null hypothesis has been statistically significant. That is, there is no structural breaking point in 1990.

Result of the Coppock Instability Index

Coppock Instability Index of GDP Growth in Bangladeshshows that the CII is 21.7 percent during the pre-liberalization regime and 12.5 percent during the post-liberalization regime. Therefore, the instability in GDP growth is higher during pre-liberalization than post-liberalization periods. The CII of pre liberalization period is also higher than that of during the overall study period (17.1 percent). That is, the data series of GDP growth is more instable in the pre-liberalization than post-liberalization periods.

Descriptive Statistics of the GDP Growth Function

The statistical description of the function indicates that mean-to-median ratio of each variable is approximately one. The standard deviation is also low compared to the mean, showing a small coefficient of variation. The range of variation between maximum and minimum is also reasonable except foreign direct investment. The numeric of skewness of each variable is low and is mildly negatively skewed but for GDP and trade openness is positively skewed. The figures for kurtosis of all variables in the growth model are below 3 which confirms near normality. The Jarque-Bera test statistics cannot accept the null hypothesis of normal distribution for each variable, except two (lnl and lnfdi), with varying probabilities. It is mentionable that data in the level form of some variables are seen non-normal with high probability in the Jerque-Bera test but they are completely normal in the first differenced form. Thus, the normality of the distribution is ensured.

Correlation among the Variables of GDP Growth Function

The correlation matrix shows that the dependent variable lngdp is positively related with all of the independent variables of the function as expected. It is also consistent with the theory of economic growth that it is the positive function of stock of labour, domestic investment, FDI and trade openness of the country. That is, economic growth in Bangladesh is always positively related by its different components (*lnl, lndi, lnfdi, and lnto*).

Table 1: Results of the Unit Root Tests (ADF, D-F (GLS) and P-P Tests)

Variables		Without an Intercept and a Linear Trend					With an Intercept and a Linear Trend			
	ADF Statistic	D-F (GLS)	P-P Statistics	Crit. Value (1%)	Crit. Value (5%)	ADF Statistic	D-F GLS Statistic	PP Statistic	Crit Value (1%)	Crit. Value (5%)
lngdp	2.4210	0.8565	-0.8804	-3.6156	-2.9411	-0.7696	-3.5109	-4.0449	-4.2191	-3.5331
Lnl	-1.1353	0.7279	-1.1151	-3.6056	-2.9369	-5.2047	-3.6327	-4.2920	-4.2050	-3.5266
lndi	-0.5070	2.1110	-2.5623	-3.6056	-2.9369	-2.5331	-1.5090	-5.6762	-4.2050	-3.5266
lnfdi	-1.5347	-0.3853	-3.1872	-3.6268	-2.9458	-3.0957	-4.6303	-4.4276	-4.2350	-3.5403
lnto	-1.4012	-1.3221	-1.6509	-3.6010	-2.9350	-3.3283	-1.9974	-7.3837	-4.2119	-3.5298
Δlngdp	-7.4781	-5.1401	-11.0380	-3.6105	-2.9390	-7.3982	-6.3831	-10.8639	-4.2117	-3.5298
Δlnl	-7.5982	-5.0535	-10.1894	-3.6105	-2.9390	-7.4806	-6.3927	-10.0497	-4.2119	-3.5298
Δlndi	-7.7713	-1.8432	-7.7713	-3.6056	-2.9369	-7.4129	-3.4013	-7.4129	-4.2050	-3.5266
Δlnfdi	-7.2476	-7.4255	-14.4624	-3.6105	-2.9390	-7.1538	-6.1607	-15.1876	-4.2119	-3.5298
Δlnto	-6.1999	-2.5362	-6.4890	-3.6056	-2.9369	-6.0794	-4.2600	-6.2760	-4.2050	-3.5266

The test is conducted with Eviews 5.1. The data are rounded at 4 digits after decimal.

Note: 95% critical value for the Augmented Dickey – Fuller statistic=-2.9665; * Critical values (5%) are from Mackinnon (1991).

Where,lngdp = output of the country used as the proxy of economic growth; lndi= domestic investment proxy of gross capital formation; lnl= stock of labour force proxy of the active population ages 15- 64 years % of total population; lnfdi = inflows of foreign direct investment; and lnto = trade openness.Δ= First Difference, * Critical values (5%) are from Mackinnon (1991).

Table 7.2.1 presents that the level values are non-stationarity as the calculated values are less than their critical values in absolute term. The null hypothesis could not be rejected then. Table futher indicates that the non-stationarity problem vanished after the first difference of the data; because the ADF statistics are greater

than their critical values at 1% and 5% level of significance and the null hypothesis of non-stationarity is rejected and the data have been found stationary after the first difference. These suggest that the series are integrated of order one I(1). The results of D-F (GLS)test indicate that the time series data of growth function have however been non-stationary at the level form but the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data have been found stationary for the integration of order one I(1). Results of the P-P test show the level values are non-stationary because the calculated values are less than their critical values in absolute term. The non-stationarity problem vanished after the first difference of the data. It can be said that the first difference of GDP growth and its various components do not have a unit root problem and the data series are stationary with integration of order one I(1). Therefore, the null hypothesizes of unit root problems have been accepted at level form. But, the problems have been vanished after the first difference. That is, the time series data of GDP function have however been non-stationary at the level form because the ADF, D-F (GLS), PP as well as the correlogram statistics are less than their critical values but they all have been found stationary at the first difference.

Table 2: Result of the Cointegration Test of the Growth Function

Since the variables lngdp, lnl, lndi, lnfdi, and lnto are integrated of order 1 (one), it confirms the possibility of cointegration between them.

Table 2: Results of the Cointegration Test of the Growth Function

H_0	H_A	Eigen Value	Trace Statistic	5% Crit. Value	Probability **	Max- eigen Value	5% Crit. Value	Probability**	Hypothesis
Cointegration Result between GDP and Stock of Labour									
r=0	r=1	0.3153	21.8508	15.4947	0.0048	15.1516	14.2646	0.0361	None*
r<=1	r=2	0.1542	6.6992	3.84147	0.0096	6.69916	3.84147	0.0096	Atmost 1*
Cointegration Result between GDP and Domestic Investment									
r=0	r=1	0.746286	68.92562	15.49471	0.0000	53.49041	14.2646	0.0000	None*
r<=1	r=2	0.326842	15.43521	3.841466	0.0001	15.43521	3.841466	0.0001	Atmost 1*
Cointegration Result between GDP and FDI									
r=0	r=1	0.640826	68.38409	15.49471	0.0000	39.93396	14.2646	0.0000	None*
r<=1	r=2	0.517846	28.45014	3.841466	0.0000	28.45014	3.841466	0.0000	Atmost 1*
Cointegration Result between GDP and Trade Openness									
r=0	r=1	0.603478	60.20864	15.49471	0.0000	36.07596	14.2646	0.0000	None*
r<=1	r=2	0.461402	24.13268	3.841466	0.0000	24.13268	3.84147	0.0000	Atmost 1*

The tests are performed withthe software Eviews- 5.1

The Trace and Max-eigen value tests indicate 2 cointegratingeqn(s) at the 0.05 level.

Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 7.3.1 states that the trace and max-eigen value testsstatistics for GDP (Δ lngdp) and other components (Δlnl,Δlndi, Δlnfdi, andΔlnto) of Bangladesh are greater than the critical values at 0.01 and 0.05 level of significance. Thus, the null hypothesis of no cointegration is rejected at 5 percent significance level. In the second row, both the trace and max-eigen value statistics are also greater than their critical values Thus, there are 2 (two) cointegrating stable relations between gross domestic products and its various components in Bangladesh in the short run and they are converging each other in the long run. The result is also supported by Rahman&Shahbaz (2011) while contradicted with Hossain& Kamal (2012).

Estimation of GDP Growth Function by OLS

The estimated GDP growth regression model is:

$$\Delta lngdp = -0.054859 + 8.628111\Delta lnl + 0.707270^{**}\Delta lndi - 0.007299\Delta lnfdi - 0.064531\Delta lnto. \quad (7.4.1)$$

The estimation is conducted with Eviews 5.1.
Note: * Coefficient is significant at 0.05 levels of significance ** Coefficient is significant at 0.01 levels.
Brackets show the standard error and the p-values of the function; thet-statistics are shown by the parenthesis.

Result shows that GDP of Bangladesh is obviously influenced by its different factors. But, the stock of labour and domestic investment positively affects it, of which domestic investment is significant. That is, an increase in domestic investment GDP will be significantly increased by 70 percent in Bangladesh. FDI and trade openness on the other hand, negatively affect GDP in Bangladesh but the effects are insignificant. This result is partially supported by Akinlo (2004). Domestic investment has a significantly positive impact on economic growth in Bangladesh. This result is supported by (Ahmed, 1985). FDI has negative and insignificant effect on GDP in Bangladesh. This result is supported by (Ghosh&Hendrik, 2006; Fabienne, 2007; Akinlo, 2004; Kim &Seo, 2003; and Matin, 1987) while the result is contradicted with (Schneider, 2005; Hossain& Kamal, 2012; Bhuvan, 2011; Ahmad &Fahian, 2010; Shujie&Kailei, 2006; Yao, 2006; Hermes &Lensink, 2003; Borensztein et al., 1998; Bengoa& Blanca, 2003; Nunnenkamp et al., 2004; Laura et al., 2004; and Quazi&Munir, 2009). Trade openness in Bangladesh has a negative and insignificant effect on economic growth. The result is also supported by Shahbaz (2012) while contradicted with (Yucel, 2009; Humayara et al., 2012). The diversification of findings may due to the difference of the sample selection, data range, model and econometric methodology used by the author.The Wald test confirms that the coefficients are jointly significant because the probabilities are less than the significance level (α=0.05, 0.01) for both F-statistic and Chi-square test.

Result of the VECM of GDP Growth Function

Results of the VECM test indicate that the long run relationships exist between GDP growth with stock of labour, FDI inflows and trade openness in of Bangladesh. The short run relationships exist between GDP and stock of labour as well as foreign direct investment in Bangladesh. The VECM term of the Growth function on the other hand, is significant for stock of labour, domestic investment, FDI inflows and trade openness in Bangladesh that means, there is short run dynamics to the long run equilibrium between GDP and domestic investment in Bangladesh while there exists long run causality but with a divergence relations between stock of labour, FDI and trade openness to the GDP growth in Bangladesh.

Table 3: Long and Short run Elasticity of Growth Function with VAR Model

Elasticity	Constant	Δlnl	Δlndi	Δlnfdi	Δlnto
Long-term	0.039684*	24.91766**	0.485424**	-0.005081	-0.010850
	(0.017077)	(0.366354)	(0.089454)	(0.002699)	(0.077535)
	[2.323804]	[68.01520]	[5.426515]	[-1.882432]	[-0.139933]
Short-term	0.021721*	14.22193	0.159142	-0.294822*	-0.109112
	(0.00916)	(10.5944)	(0.29650)	(0.16462)	(0.17863)
	[2.37027]	[1.34240]	[0.53674]	[-1.79089]	[-0.61083]

The estimation is conducted with Eviews 5.1.
Note: ** Statistically significant at 1 percent level of significance; * significant at 5 percent level of significance. The standard error is shown in the bracket while the t-statistics are shown by the parenthesis.

The first row of the Table 7.6.1 indicates the long run elasticity of the GDP growth (Δlngdpt) function because it contains the coefficients of the log values of the estimated function. It shows that the elasticities of the stock of labour, domestic investment and the constant term are significant. That means an increase in domestic investment may increase GDP growth by 49 percent in Bangladesh. The coefficient of FDI is negative but insignificant. The coefficients of the differenced independent lag values in the second row of the table shows that the coefficients of the constant term, stock of labour force, and FDI are statistically significant at 5 percent level of significance. The coefficients of labour force and FDI are negatively elastic; whereas, the coefficient of constant term is positively elastic with GDP growth in the short run in Bangladesh. Trade openness is insignificant both in the short and long run. This may due to the insignificant contribution to the domestic economy of Bangladesh.

Result of the Granger Causality Test

Table 7.7.1 shows that the null hypothesis of stock of labour does not cause GDP is rejected at 0.05 percent level as the F-statistic is significant. The null hypothesis of GDP growth does not Granger cause stock of labour is also rejected as the F-statistic is significant. The null hypothesis of GDP does not cause domestic investment indicated in the second row of the table is accepted as F-statistic is insignificant at 0.05 levels. That is, domestic investment causes GDP in Bangladesh but GDP does not cause domestic investment to grow. The result is supported by (Islam et al., 2005) while contradicted with (Tang et al., 2008). The third row of the table, indicates that the null hypothesis of FDI does not Granger cause GDP is accepted as the F-statistic is insignificant at 0.05 level. On the other hand, GDP does not cause FDI in Bangladesh is rejected as the F-statistics is significant then. That is, FDI does not cause GDP but GDP causes FDI inflows in Bangladesh.This result is supported by (Zambe&Yue, 2010; Tang et al., 2008; and Paul, 2011) while contradicted with (Liu et al., 2002; Hossain& Kamal, 2012; and Shafiun et al., 2009). Trade openness in Bangladesh causes GDP as the null hypothesis is rejected while GDP also cause trade openness as F-statistic is significant. That is, both trade openness and GDP of Bangladesh cause each other to grow at the same tandem. The result is supported by (Yucel, 2009) while contradicted with

(Zambe&Yue, 2010; Shafiun et al., 2009; and Adhikary, 2012).

Table 4: Results of Pair-wise Granger Causality Test of the GDP Growth Function

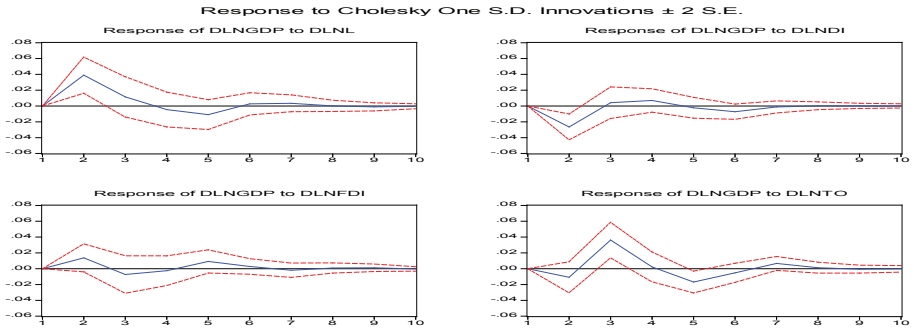
Null Hypothesis	Obs.	Lag	F-Statistic	Probability	Decisions
Δlnl does not Granger Cause *Δlngdp*		1	7.11970	0.01115	Rejected**
Δlngdp does not Granger Cause *Δlnl*	40		7.03931	0.01157	Rejected**
Δlndi does not Granger Cause *Δlngdp*		1	4.02478	0.05219	Rejected*
Δlngdp does not Granger Cause *Δlndi*	40		0.86134	0.35938	Accepted
Δlnfdi does not Granger Cause *Δlngdp*		3	0.65828	0.58394	Accepted
Δlngdp does not Granger Cause *Δlnfdi*	38		3.88784	0.01812	Rejected**
Δlnto does not Granger Cause *Δlngdp*		1	11.4045	0.00174	Rejected**
Δlngdp does not Granger Cause *Δlnto*	40		5.77413	0.02139	Rejected*

The test is performed with Eviews 5.1.

Note: *Rejection of the null hypothesis of no causation at 0.05 significant levels. ** Rejection of the null hypothesis of no causation at 0.01 significant levels. *** The negligible rejection of the null hypothesis of no causation.

Thus, there are bidirectional causalities between pair wise stock of labour, trade openness and GDP growth in Bangladesh. That is, they cause each other to grow at the same direction. Otherwise, there exist unidirectional causality. That is, domestic investment causes GDP to grow but GDP does not play the same role for the domestic investment. FDI on the other hand, does not significantly cause GDP to grow but GDP causes FDI inflows in Bangladesh in the short run.

Figure 1: Impulse Response Analysis of GDP Function in the VAR Model



*For researcher's convenience only 10 subsequent periods are considered.

The test is conducted with Eviews 5.1.

Figure 7.8.1(a) presents the response of GDP to stock of labour force indicated by the figure 7.8.1(a) which reveals that it was favourable up to fourth period but negative effects are continued up to sixth period and it again goes to the steady positive position and are converging each other over the period. Likewise, domestic investment, foreign direct investment and trade openness had only the positive or negative implications in short run. But, the bad implication decreases henceforth and they are converging each other in the long run. Thus, the response of all variables is either positive or negative in the short run but in the long run they all are responded towards the economic growth in Bangladesh.

Variance Decompositions of the GDP Growth Function

The variance decomposition output was documented that the variance of GDP growth is always caused by 100 percent by itself in the first year. In the second year, the GDP variance is decomposed into its own variance (67.36%) followed by stock of labour (17.78%), domestic investment (14.14%), foreign direct investment (0.36%) and trade openness (0.36%) in Bangladesh. However, in subsequent years, the share of labour increases to approximately 18.24% followed by the domestic investment, foreign direct investment and trade openness are increased to (15.35%, 2.24% and 1.96% respectively). The share of trade openness is very much fluctuated to the GDP growth in Bangladesh. The volatility of GDP growth is mainly caused by its own variation, as it always accounts for major portion (above 62%) of the fluctuations.

Table 5: Results of Autocorrelation and Heteroscedasticity Tests

	Lagrange Multiplier Test			White General Heteroscedasticity Test		
Tests	L-M Statistics	Probability	Conclusions	WH Statistics	Probability	Conclusion
F-statistic	2.886772	0.098183	No Autocorrelation	14.98310	0.000000	No Heteroscedasticity
Obs*R-squared	3.123984	0.077148	Normally Distributed	32.36074	0.000080	Normally Distributed

Source: Results are drawn from the equation (6.3.1) and the tests are performed with software Eviews 5.1.

Table 7.10.1 indicates the results of the autocorrelation of the GDP growth equation. In case of equation (7.4.1), both the probability values are greater than (α= 0.01). The F-statistic of the L-M test is 2.89 and the probability is 0.10 which is greater than 0.01 (α). That is, the null hypothesis of autocorrelation is rejected. Likewise, Breusch–Godfrey serial correlation test reveals no autocorrelation among the variables (Obs*R-squared 3.12 with associated P-value 0.08). These imply that the estimated GDP growth equation does not suffer from autocorrelation problem as well as the residuals follow the normality of the distribution. Table further indicates that the F-statistic of the White Heteroscedasticy test is 14.98 and respective probability is 0.0000 which is smaller than the critical value (α) 0.01 and 0.05. This implies that the null hypothesis of no heteroscedasticity is accepted that is, the equation (7.4.1) is free from heteroscedasticity problem. The Breusch–Pagan-Godfrey test also reveals homoscedasticity (Obs*R-square 32.36 with associated P-value 0.00008 which is less than 0.01 and 0.05 level) of the distribution. Therefore, there is no heteroscedasticity problem as well as the estimated residuals are normally distributed. Theory also supports these results.

Results of the Stability Tests of the Models

Results show that the plots of CUSUM and CUSUMSQ statistics stay within the 95 percent confidence interval. This implies that the estimated coefficients and their variances of the model are stable over the period. That is, there is no structural change over the period. On the other hand, the statistics of CUSUMSQ test begins

from outside of the confidence interval and remains outside of the interval up to the year 2000. Then, it falls inside the 95 percent interval and remains inside to the date. These imply that estimates and the variation of the estimates of the model have the short run structural breaks but are stable over the period. Thus, a short run structural change is found in the growth model but stable in the long run. Finally, it could be concluded that the models are structurally stable and specified.

5. Policy Implication

The estimated coefficients of the growth function (7.4.1) indicate that GDP of Bangladesh is obviously influenced (positively and negatively) by its selected factors. The stock of labour and the domestic investment have positive impacts on GDP growth of which the impact of domestic investment is significant by 70% in Bangladesh. FDI and trade openness on the other hand, negatively affect GDP growth in Bangladesh but they are insignificant.Investment of a country is the nucleus of economic growth. But, the investment position of Bangladesh is very poor either for domestic or foreign investment. Domestic investment in Bangladesh suffers with the scarcity of capital formation. Due to the wide gap of saving and investment local entrepreneurs look for foreign capital. The foreign capital is often restricted by countries trade policies. Obviously, it may seem that FDI fosters economic growth because of many reasons. Firstly, it brings the technological improvement in the host country which gears the export and thus, development. Secondly, for the import substitution firms, it enhances competition and that increases efficiency and productivity. Thirdly, it creates the employment opportunity for the host country. Fourthly, FDI results in an increased demand for exports from the host country and helps to attract domestic investment in the export industry. Trade openness maintains a significant channel between investment and economic growth of a country. In addition with greater efficiency, as a result of trade openness many of the developing countries follow the suit with the export-led strategies. Hence, the necessity of the research work has a significant imporrtance in the perspective of the country's need.

Policy Regarding the Issue in 7th FYP (2016-2020)

Progress in transforming the economy from a rural-based agrarian economy towards a more modern urban-based manufacturing and service based economy provides a sound basis for further transformation during the Seventh Plan to meet up the vision 2021. The core targets regarding the issues in accordance with the vision 2021 and goals of the perspective plan under the 7th FYP are:

i) Attaining average real GDP growth rate of 7.4% per year over plan period;

ii) Creating good jobs for the large pool of under-employed to manufacture sector from 15 to 20%;

iii) Substantial improvement of exports to $54.1 billion by FY2020;

iv) Achieving a trade-GDP ratio of 50% by FY2020; and

v) FDI to be increased substantially to $9.6 billion by FY2020.

Table 6: Macroeconomic Scenario of the 7th Five Year Plan

Macro Indicator	FY14(Actual)	FY15(Estimated)	FY16	FY17	FY18	FY19	FY20
Real GDP Growth (%)	6.1	6.5	7.0	7.2	7.4	7.6	8.0
Gross Domestic Investment (% of GDP)	27.2	28.9	30.1	31.0	31.8	32.7	34.4
Private Investment (% of GDP)	22.0	22.1	23.7	23.9	24.4	25.1	26.6
Public Investment (% of GDP)	6.5	6.9	6.4	7.1	7.4	7.6	7.8
National Savings (% of GDP)	29.2	29.0	29.1	29.7	30.2	30.7	32.1

Source: Bangladesh Bureau of Statistics and 7th FYP projections.

The key challenge is to increase the rate of investment form 28.9% of GDP in FY15 to 34.4% of GDP by the end of the Plan in FY20. Efficiency of domestic investment, particularly in the public sector, will be important for realizing the maximum benefits out of the public sector investment plan. The 7th Plan aims to achieve an average growth rate of 7.4% of GDP from the average level of growth at 6.3% recorded under 6th FYP. If the planned growth targets are achieved, it would mean that per capita GDP would increase by an average of about 6% per annum during the 7th Plan period, reaching a peak of 6.7% by the end of the plan.One of the major macroeconomic problems for Bangladesh under the 6th FYP was the continued stagnation of domestic private sector, failure on the part of the government to launch major investment projects under the public- private partnership (PPP) and inability to attract foreign direct investment into the country. Thus, the lesson from the 6th FYP is that, accelerated growth target of 8% by the end of the 7th FYP is to be realized; the level of domestic investment must go up by 5.5% points to 34.4% of GDP byFY20. Much of the growth of additional investment in relation to GDP is projected to come from the private sector (77.3% of gross investment) by the end of the Plan.The 7th Plan aims to reach the export target of US$54.1 billion with export growth averaging about 12% per annum over the planned period. This projection is also broadly consistent with the RMG export target of US$50 billion by FY21, the 50th anniversary of the independence of Bangladesh announced by the BGEMA and also endorsed by the government. The faster growth of the manufacturing sector would only be attainable under this export-led growth strategy, if exports grow at a much faster rate than the overall GDP growth.

Policy Recommendations

On the basis of the findings of the study, the following policies should be adopted for stimulating economic growth in Bangladesh through domestic investment, FDI and trade openness:

i) Effort should be made to keep the GDP growth rate stable and the gap

of targeted and achieved GDP growth rate in Bangladesh should be reduced. Strengthening government institutions and the rule of law will do much to improve the climate for investment, productivity and growth.

ii) Wage rate in Bangladesh should be rationalized so that labourer can have a minimum guarantee of maintaining their livelihoods. Individual and national savings should be increased for domestic capital formation.

iii) Trade integrated liberalization policies should be adopted for increasing the degree of trade openness that may attract foreign investors to the country;Initiatives should be taken to increase export items as well as to get back the benefit of GSP in the US market for country's RMG products;and an appropriate trade policy so that trade openness could maintain a channel between investment and economic growth.

From the findings, it has been imperative for the government of Bangladesh to formulate human development policy to increase managerial skills, technological knowhow and efficiency of labour. It should also adopt policy to create more avenues towards the capital formation through instigating national savings for domestic investment. It should also adopt policy to attract FDI inflows by abolishing the constraints regarding inward FDI.

6. Conclusion

The objectives of this paperare to assess the impact of labour, domestic investment, FDI and trade openness on economic growth of Bangladesh and to examine the short and long run causal relationships associated with them. The structural break point and the stability of the function have been examined first with the Chow and Coppock Instability Index that show no structural break point in 1990 as well as the instability index is higher in the pre-liberalization than the post-liberalization periods in Bangladesh. The JarqueBera and the correlation matrix show that the data series are normally distributed and the variables are positively correlated to each other. For econometric analysis the unit root test results show that all the variables in the function have been suffering with unit root problem at their levels. But, they all have been freed from the problem after their first differences which ensures that there are 2 (two) cointegrating stable long run relationships between the pair-wise variables of the GDP growth function. The OLS estimated coefficients of the growth function indicate that the labor and domestic investment positively affect economic growth of which domestic investment is significant. GDP of Bangladesh is again negatively influenced by FDI and trade openness but they are insignificant. The VECM results show that the long run relationships exist between stock of labour, FDI and trade openness to GDP growth while, the short run relationships exist between stock of labour, FDI and

GDP growth in Bangladesh. There is a short run dynamics to the long run equilibrium between domestic investment and GDP otherwise, short run dynamics but a divergence relation exist.The VAR results show that the long run positively significant elasticities exist among labour and domestic investment to economic growth in Bangladesh while the short run negative significant elasticities exist between labour force and FDI to GDP growth in Bangladesh. The Granger causality test shows that there are bidirectional causalities between pair-wise stock of labour, trade openness and GDP growth in Bangladesh. Otherwise, there is unidirectional causality between the pair-wise residual variables of GDP growth function. The response of all variables is either positive or negative in the short run but in the long run they all are responded towards the GDP growth in Bangladesh. The variance decomposition ensures that all the variables are volatile in the short run but it is very high for the case of FDI in Bangladesh. Thus, the government needs to work out all of its institutional frameworks to enhance and monitor the inflow of the FDI. So that it could significantly contribute to the economy of Bangladesh. Finally, policy alone is not sufficient to attract the handsome inflow of FDI. Overcoming the aforesaid impediments towards the inflow of FDI in Bangladesh should be met up. If it is possible, definitely Bangladesh would be able to attract a lion's share of FDI among South Asian regions and thereby achieve its target of higher economic growth and sustainable development in the long run. But, the first emphasis should be given on the enhancement of domestic investment by increasing domestic capital formation and reducing other constraints for stimulating private domestic investment in Bangladesh for sustainable economic growth.

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