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# An Econometric Analysis of Investment, Trade Openness and Economic Growth in Bangladesh

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# An Econometric Analysis of Investment, Trade Openness and Economic Growth in Bangladesh

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**by**

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# An Econometric Analysis of Investment, Trade Openness and Economic Growth in Bangladesh

**A Dissertation of Doctor of Philosophy in Economics**


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**May 2016**

# Declaration

I do hereby declare that the thesis entitled ***"An Econometric Analysis of Investment, Trade Openness and Economic Growth in Bangladesh"*** submitted for the degree of Doctor of Philosophy in Economics at the Institute of Bangladesh Studies (IBS), University of Rajshahi, Bangladesh is exclusively the outcome of my own research work done under the direct supervision of Dr. A. N. K. Noman, Professor, Department of Economics, University of Rajshahi, Bangladesh.

No portion referred to this thesis in any form has been submitted to any university or any other institute of learning for any degree, diploma or any other similar purposes.

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# Certification

I am pleased to certify that the thesis entitled, ***"An Econometric Analysis of Investment, Trade Openness and Economic Growth in Bangladesh"*** is an original research work of **Md. Raihan Islam** under my supervision for the award of the degree of Doctor of Philosophy in Economics from the Institute of Bangladesh Studies (IBS), University of Rajshahi, Bangladesh.

This research is done under my direct supervision and guidance. I have gone through the draft and final version of the thesis and it appears to be satisfactory for the submission for the degree of Doctor of Philosophy in Economics.

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**Dedication**

**To**

***My Parents and Family***

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# Abstract

Investment (domestic plus foreign investment) is the emotive force for economic growth of a country. Domestic investment is positively associated with domestic capital formation. FDI complements 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 study, however, attempts to find out the impact of domestic investment, FDI and trade openness on economic growth and their causalities in Bangladesh. It further examines the influences of different components of the core variables (domestic investment, FDI, trade openness) on them and analyzes the short and long run causal relationships among them at the disaggregated level. Doing so, it undertakes the sample of 42 annual observations covering the period of 1972 to 2013. In this context, the objectives of this study are: to assess the current states of domestic investment, FDI, trade openness and economic growth in Bangladesh; to assess the influences of different components of domestic investment, FDI, trade openness on these core variables at the disaggregated level; and to examine the short and long run causal relationships associated with domestic investment, FDI, trade openness and economic growth in Bangladesh. In order to meet these objectives, a disaggregated econometric analysis has been carried out in this study. The tabular and graphical techniques have been used to assess the current states of the variables. They indicate that the variables of the core function (e.g. economic growth is the function of domestic investment, FDI and trade openness) have the upward trends over the time but individually they all are stable in Bangladesh. The variables at the disaggregated level are also suffering with the instability problem. In every case, the instability index is higher during pre-liberalization than that of the post-liberalization period (1990). The theoretical frames with model specifications of the issue and the variables of the respective functions with evidence in the literature have been discussed in this study.

In econometric analysis, the time series properties of the data of domestic investment, FDI, trade openness and GDP growth functions have been justified successively. In this context, the unit root tests such as, the correlogram test, the ADF test, the D-F (GLS) test, and the Phillips-Perron test have been applied in the study. For each of the functions the tests provide the same results that is, the null hypotheses of unit root problem have been accepted at the level form but they have all been rejected at the first

difference. Hence, the data of the variables of the domestic investment, FDI, trade openness and growth functions for Bangladesh have been found non-stationary at the level form but they have been stationary at the first difference. Thus, the variables of the functions have been integrated of order one *I(1)*. Results of the cointegration test (the trace and max-eigen value tests) confirm that there are 2 (two) long run cointegrated stable relationships between domestic investment and its various components, FDI and its different factors, trade openness and its major components while same results have also been found for economic growth of Bangladesh with stock of labour, domestic investment, FDI as well as trade openness of the country.

In order to assess the influence of the components of different functions, OLS method has been applied for estimations. Results indicate that domestic investment of Bangladesh is however influenced by its different factors but financial intermediation and human capital have significantly negative effects while GDP growth rate, FDI, real export and domestic credit have positive impact on domestic investment in Bangladesh. The OLS estimated coefficients of the FDI function indicate that FDI in Bangladesh is no doubt influenced by its various factors but gross capital formation significantly negatively affects it while GDP growth rate and wage rate in Bangladesh positively affect FDI. Again, FDI in Bangladesh is negatively influenced by the GDP, stock of labour and trade openness but they are insignificant. Results further show that trade openness in Bangladesh is positively influenced by its different components (GDP, real export, real import, and real exchange rate).The terms of trade and the real inflation have significantly negative effect on trade openness in Bangladesh. Finally, the estimated coefficients of the growth function indicate that GDP of Bangladesh is definitely influenced by its different components. The stock of labor and domestic investment positively affect economic growth in Bangladesh of which, the impact of domestic investment on economic growth is significant. That is, domestic investment positively affects GDP by 70 percent while the impact of labour is insignificant. GDP of Bangladesh is negatively influenced by FDI and trade openness but they are insignificant. This may be due to insignificant contribution of them on the domestic economy of Bangladesh. The Wald test confirms that the coefficients of GDP growth, FDI and trade openness functions are jointly significant while the coefficients of domestic investment are not jointly significant but some of them may be individually significant.

For domestic investment, the VECM result shows that there is short run dynamics to the long run equilibrium among GDP growth rates, real exports, human capital and domestic investment while there is long run causality but with a divergence among FDI, financial intermediation, domestic credit availability and domestic investment in Bangladesh. Result further shows that there is short run dynamics to the long run equilibrium among GDP, gross capital formation, stock of labour and the wage rate to FDI while there is long run causality but with a divergence relation among GDP, trade openness and FDI in Bangladesh. Again, there is short run dynamic adjustment to the long run equilibrium among GDP, real import, terms of trade and trade openness in Bangladesh while there is long run causality but with a divergence among real export, real exchange rate, real inflation and trade openness. Results further show that there is short run dynamics to the long run equilibrium between domestic investment and GDP growth while there is long run causality but with a divergence relation among stock of labour, FDI, trade openness and GDP growth in Bangladesh.

The VAR estimation shows the elasticities of the functions that is, the coefficients of real exports and domestic credit availability are significant for domestic investment in Bangladesh while others are insignificant. The short run positive elasticities of GDP growth rate, FDI and financial intermediations are statistically significant while others are inelastic for domestic investment in Bangladesh. The long run significant elasticities exist between gross capital formation and FDI while the short run significant elasticities exist among GDP, gross capital formation, stock of labour and wage rate in Bangladesh to FDI, they may either be positive or negative. Again, the long run significant elasticities exist among real export, terms of trade and trade openness while the short run significant elasticities exist among real imports, real exchange rate and trade openness in Bangladesh. The VAR result finally 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 in Bangladesh.

The Granger causality test indicates that there are short run bidirectional causalities between pair-wise real export and domestic credit availability to domestic investment; otherwise unidirectional causalities exist between the pair-wise variables of the domestic investment function in Bangladesh. In case of FDI function, there are bidirectional causalities between FDI and GDP growth rate; otherwise unidirectional causality exists between the pair-wise variables of the FDI function in Bangladesh. On the other hand, there are bidirectional causalities between trade openness and real exports; otherwise, unidirectional causality exists between the pair-wise variables in the trade openness function. Results of Granger Causality test further show that there are bidirectional causalities between stock of labour and the GDP growth in Bangladesh. On the other hand, domestic investment causes GDP to grow but GDP in Bangladesh does not do so. FDI in Bangladesh does not Granger cause GDP to grow but GDP causes FDI to inflow. Again, both trade openness and GDP Granger cause each other to grow at the same direction. Thus, bidirectional short run causalities exist between pair-wise labour and trade openness to GDP while unidirectional causality exists between pair-wise domestic investment and FDI to GDP growth in Bangladesh.

Results of Impulse Response Analysis of domestic investment function indicate that the response of all variables is either positive or negative in the short run but in the long run they all are responded towards domestic investment in Bangladesh. It further confirms that the response of all variables of the FDI function is either positive or negative in the short run but in the long-run they all are responded towards FDI in Bangladesh. Whereas, the diversification of responses of GDP, real exchange rate as well as real inflation to openness are very high in the short run but they all have been responded towards the same path in the long run. The results finally confirm that the diversification of responses of stock of labour, domestic investment, FDI, as well as trade openness is very high in the short run but they all have been responded towards the same path of GDP in the long run.

The variance decomposition outputs indicate that the changes in domestic investment are mainly caused by its own variation. The volatility of domestic investment is mainly caused by its own variation. The variance of foreign direct investment is always caused by 100 percent by itself and the share of FDI subsequently decreases over the year while the volatility of FDI is mainly caused by above 80% of its own variation. The variance of trade openness is always caused by 100 percent by itself in the first year and decreases gradually in the subsequent years. Again, the GDP is decomposed into its own variance by stock of labour, domestic investment, FDI, and trade openness while the share of GDP in explaining the variance decomposition decreases gradually. Finally, the model diagnostics (the L-M, the B-G, the WGH, the CUSUM and the CUSUMSQ tests) confirm the model stability and they have made the findings consistent, robust and valid.

From the findings of the study, it has been imperative for government of Bangladesh to formulate human development policy to increase managerial skills, technological know how 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 adopt policy to attract FDI inflows by abolishing the constraints regarding inward FDI. Finally, government should formulate improved export-led growth policy for favourable external balance as well as to increase exports of Bangladesh by reducing trade barriers. Interestingly, with a great perception about Bangladesh of its great potential in absorbing FDI into the country, it shows that FDI has not really aided the economic growth in Bangladesh. This perception might be ascribed to investment constraints like, corruption, bad governance and the decay within the economy of 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. But, the first emphasis should be given on the enhancement of domestic investment through instigating the process of domestic capital formation. Government should also take proper initiatives in reducing different constraints for stimulating private domestic investment in Bangladesh for sustainable economic growth.

# List of Acronyms

ADF = Augmented Dickey Fuller
APF = Aggregate Production Function
ARDL= Autoregressive Distributed Lag
ASEAN = Association of South East Asian Nations
BEPZA = Bangladesh Export Processing Zone Authority
BER = Bangladesh Economic Reviews
BG = Breusch-Godfrey
BOI = Board of Investment of Bangladesh
BOP = Balance of Payment
BRICS = Bangladesh, Russia, India, China & South Africa
BSCIC = Bangladesh Small and Cottage Industries Corporation
CEEC = Central and East European Candidates
CLRM = Classical Linear Regression Model
DI = Domestic Investment
ECM = Error Correction Model
FAO = Food and Agricultural Organization
FDI = Private Foreign Direct Investment
FY = Fiscal Year
GDP = Gross Domestic Product
GOB = Government of Bangladesh
GSP = Generalized System of Preference
IMF = International Monetary Fund
IPOs = Import Policy Orders
IRA = Impulse Response Analysis
LDCs = Least Developed Countries
LM = Lagrange Multiplier
LR = Likelihood Ratio
MFN = Most Favoured Nations
ML = Maximum Likelihood
MNE = Multinational Enterprizes
OLS = Ordinary Least Squares
PFI = Private Foreign Investment
RIR = Real Interest Rate
RMG = Ready Made Garment
SAARC = South Asian Association for Regional Cooperation
SEM = Simultaneous Equation Model
TFP = Total Factor Productivity
TNCs = Transnational Corporations
TO = Trade Openness
UNCTAD = United Nations Conference on Trade and Development
UNDP = United Nations Development Program
UR = Uruguay Round
VAR = Vector Autoregression
VECM = Vector Error Correction Modeling
WB = World Bank
WDI = World Development Indicators
WGH = White General Heteroscedasticity
WRI = Wage Rate Index
WTO = World Trade Organizaiton
JETRO = Japan External Trading Organization

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# Chapter One: Introductory Analysis

## 1.1 Introduction

Investment has acquired considerable emotive force in an 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 at al., 2001, pp. 522-523).

The issue of economic prosperity is often linked to massive inflows of foreign direct investment (FDI) into a nation, domestic investment i.e. the gross internal capital formation of a country and the impact of FDI through trade openness (the ratio of export and import to GDP) on economic growth. The issues have been argued considerably in the development and economic growth literature for many years. 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 again 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.

There have been different strands of theoretical and empirical studies aimed at investigating the relationship among domestic investment, FDI, trade openness and growth as well as in their various components in the disaggregated level both in developed and developing countries. 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, foreign direct 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, foreign direct investments (FDI), trade openness and economic growth as well as at the disaggregated level in Bangladesh. Theoretically, the interrelationships among these macro economic variables are tended to be positive. This study however, tries to assess the impact of and the nexus among domestic investment, foreign direct investment (FDI), trade openness on economic growth in Bangladesh. It further attempts to assess the impact of and examine the relationships among various components of domestic investment, FDI and trade openness at the disaggregated level. In this context, the sample of this study is spanned with 42 annual observations (1972 -2013). For empirical analysis of this study, improved econometric data analysis techniques have been used appropriately.

### 1.2 Statement of the Problem

Economies of the world are going to be integrated and opened (among themselves) to free trade due to globalization day by day. Hence, they are implementing liberal economic policies which are encouraging huge capital inflows from the first world countries to LDCs specially. Over the last decades, the remarkable increase in FDI inflows to developing countries' demand and analysis of the impact of FDI on economic growth have become the burning issue. The investment in Bangladesh is consisted of private vs. public and local vs. foreign investment. The economy in Bangladesh has been gradually drawing the attention of private sector investors since it's opening up of BoI in the early 90's when manufacturing is becoming increasingly vibrant claiming a significant share in the total investment. During 1991-92 to 2002-07, cumulative private investment registered with

Board of Investment (BOI) was totaled US$ 25,933 million. The registered investments consist of 47.65 percent as local and 52.35 percent as foreign (BOI, 2008).

The impact of the different components of domestic investment, FDI, and trade openness and their interrelationships associated with them are not always in the same direction in Bangladesh. Some components affect them positively while others affect negatively. Some components are significant for them while others are not. Again, the nature and trend of those components may have different and negative so that they could hardly affect economic growth of the country. Therefore, it has also become the burning issue to analyze the influences of different components of domestic investment, FDI and trade openness as well as the causal relationships associated with them at the disaggregated level in Bangladesh.

The relationship among domestic investment, FDI and economic growth in developing countries is not a one-way relationship. The impact of domestic investment and FDI on economic growth is not always positive and significant. Direct foreign private investment does not only affect domestic investment and economic growth but is also affected by them. Economies that enjoy relatively higher rates of growth succeed in attracting foreign investment. On the other hand, foreign investment contributes to the acceleration of economic growth for a number of reasons: i) the inflow of foreign capital results in an expansion of the productive capacity of the economy; ii) capital inflows at substantial rates reduce the need for borrowing; iii) FDI is usually accompanied by know-how, up-to-date technology and managerial skills that are essential for economic growth; and iv) it usually assists in the expansion and creation of new markets. Zhang (2001) has studied the causal relationship between FDI and economic performance in both East Asian and Latin American countries. He concluded that a key advantage created by FDI to recipient countries is technology transfer and spillover efficiency. This advantage, however, does not automatically occur, rather depends on recipient countries' absorptive capabilities, such as a liberal trade policy, human capital development, and an export-oriented FDI policy.

Bangladesh in fact, opened her economy in the late 1980s to reap the benefits of FDI in order to accelerate economic growth. The government set up Board of Investment (BOI) in 1989 to promote and facilitate private investment both from domestic and overseas sources. The government also lifted restrictions on capital and profit repatriation gradually and opened up almost all industrial sectors for foreigners to invest either independently or jointly with the local partners. Further, the government introduced various financial and non-financial incentives like tax exemptions for power generations, import duty exemptions for export processing industries, tax holiday schemes for undertaking investment in priority sectors and low development areas, zero duty rate for the import of capital machinery and spare parts for 100 percent export oriented industries, almost no restrictions on the entry and exit mode, and reduction of bureaucratic hassles in getting faster approvals of foreign projects. With all these incentives followed by a low labor cost structure, Bangladesh has been an attractive destination for FDI in the South Asian region since the late 1980s as Bangladesh is suffering with high rate of saving investment gap over the year.

The flows of FDI (as a percentage of GDP), degree of trade openness, level of capital formation over GDP for domestic investment and GDP growth rate in Bangladesh for a period 1986 to 2008.Reports show that Bangladesh has significantly opened her economy during the previous two decades from 17.57% in 1986 to 49.09% in 2008 in order to encourage cross-border transactions. Likewise, the gross capital formation as a percentage of GDP increased consistently from 16.70% in 1986 to 24.08% in 2008. However, FDI inflow as a percentage of GDP provides a heterogenic trend that mainly increased from 1995 (0.24%), but dropped in 1999 (0.69%), reached a peak in 2005 (1.46%) and leveled off 1.39% in 2008. Similarly, with respect to GDP growth rates, the country exhibits a heterogenic GDP growth trend that varies between 2.15% to 6.62% over the period 1986-2008 (BER, 2012). But, the country has not yet attracted a significant foreign investment for expected economic growth.

All these create an interest for the researcher to empirically investigate the impact of domestic investment, FDI and trade openness on economic growth as well as to examine the causal relationships among them in Bangladesh with a view to assisting policy making institutions. It is notable that there exists a growing body of literature that examines individually domestic investment, FDI, trade openness and capital led growth hypothesis in a country specific analysis. But, literature related to the different components of domestic investment, FDI and trade openness in Bangladesh at the disaggregated level have rarely been found. To the researcher’s knowledge, no previous study has included such macroeconomic variables in examining the effectiveness, causality and linkage among domestic investment, FDI, trade openness and economic growth in Bangladesh. The study has however been tried to analyze the effects, causalities and the relationships among domestic investment, FDI, trade openness and economic growth as well as to investigate the influences of the different components and their causal relationships at the disaggregated level in Bangladesh.

### 1.3 Research Gap in the Literature

The empirical literature on the impact of and the linkages among domestic investment, FDI, trade openness and economic growth does not provide a consensus result with its theoretical relationship as many authors document positive impact or relationship between them while others do not trace it, or at best, report very weak relationship or insignificant impact. The impact of the various components of domestic investment, FDI and trade openness as well as their causal relationships at the disaggregated level also provides contradictory results. These wide differences basically result from authors' perspectives, sample selection (time series, cross-section, panel data and data ranges), methodologies and analytical tools applied in their studies (Bajwa & siddiqui, 2011; Adhikary, 2011; Ahamad & Tanin, 2010; Sumei, et al., 2008, Shujie & Kailei, 2006; Chakrbarti, 2001). Moreover, a very few studies have been conducted empirically on this contemporary issue in Bangladesh (Hossain & Kamal, 2012; Humayara et al. 2012; Ahamed & Fahian, 2010; Shafiun et al. 2009;Qamarullah, 2007; Matin, 1987). The results are also not consensus on the issue.

This study however, differs from earlier studies in a number of respects. First, it represents the attempt to directly assess the impact of domestic investment, FDI and trade openness on economic growth and to test the relationships associated with them in Bangladesh. It further analyzes the impact of different components of domestic investment, FDI and trade openness as well as their interrelationships associated with them at the disaggregated levels which are hardly touched by the earlier studies in Bangladesh. Second, time series data will be used in this study while previous studies use either cross-sectional data or panel time series data (e.g., Braunstein & Epstein, 2002; Sun, 1998) which are likely to suffer from problems of data comparability and heterogeneity (Srinivasan & Bhagwati, 1999; Atikson & Brandolmi, 2001). Third, the earlier studies do not use Solow neo-classical, Romer endogenous and APF model simultaneously but this study has done so. Fourth, this study has also tested the impulse response analysis for testing the shocks of standard deviation of time series data and applied the variance decomposition model to examine the variability of the functions. Fifth, the pre and the post-estimation model diagonostic tests have been applied for the robustness and the consistency of the models and the results. Thus, there remains a major research gap in the existing literature and this study has been an attempt to fulfill the identified gap. This study has thus become an extension of a country specific analysis to add knowledge in the existing empirical literature.

### 1.4 Research Questions

Reviewing and studying various issues related to the concept and problem statement of domestic investment, FDI, trade openness and economic growth in Bangladesh, the following research questions have been raised for the study:

i) What are the current states and trends of domestic investment, FDI, trade openness and economic growth in Bangladesh?

ii) What does the impact of different components play on domestic investment in Bangladesh?

iii) What relationships of different components exist with domestic investment in Bangladesh?

iv) What factors are responsible for FDI inflows in Bangladesh?

v) What relationships of different components exist with FDI in Bangladesh?

vi) How do different factors affect trade openness in Bangladesh and what relationships exist among them?

vii) How do domestic investment, FDI and trade openness affect economic growth in Bangladesh? and

viii) What linkages exist among domestic investment, FDI, trade openness and economic growth in Bangladesh?

### 1.5 Objective of the Study

The general objective of this study is to provide an econometric analysis of domestic investment, FDI, trade openness and economic growth in the disaggregated level in Bangladesh, so that the better and suitable policy options can be adopted to maintain them. From the above background and research questions, this study is guided by the following specific research objectives:

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

ii) to assess the degree of influences of the components of domestic investment on it as well as to measure their causal relationships;

iii) to assess the influence of different components of FDI on it as well as to measure their causal relationships;

iv) to measure the influence of different factors of trade openness index on it as well as to measure their causal relationships; and

v) to assess the impact of domestic investment, FDI and trade openness on economic growth as well as to examine their causal relationships in Bangladesh.

**1.6 Hypothesis of the Study**

This study undertakes the following testable hypotheses for the empirical evidence:

i) Domestic investment is positively influenced by GDP growth rate, FDI, financial intermediation, real export, human capital and domestic credit;

ii) FDI is negatively influenced by GDP, GDP growth rate, gross capital formation, trade openness, stock of labour and wage rate;

iii) Trade openness is positively influenced by GDP, real export, real import, terms of trade, real exchange rate and real inflation;

iv) Domestic investment, FDI and trade openness have a significantly positive impact on economic growth in Bangladesh;

v) Trade openness maintains a significant channel among domestic investment, FDI and economic growth in Bangladesh;

vi) There is at least one cointegrating relationships between the pair-wise variables of different functions; and

vii) There are bidirectional causalities among FDI, domestic investment, trade openness and economic growth in Bangladesh.

**1.7 Justification of the Study**

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. Again, domestic investment, FDI and trade openness of Bangladesh are also affected by different components. Thus, a disaggregated analysis of the impacts and the relationships associated with them is imperative in Bangladesh. 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. The opposite arguments are: i) FDI may reduce the savings and thus less domestic investment, which may result in reduction in growth; ii) it may crowd out domestic investment, which may result into reduction in the economic growth (Razzaque & Ahmed, 2000). 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. Nevertheless, there are clear indications that growth enhancing effects from domestic investment, FDI inflows, and trade openness vary from country to country. To this point, there have been diverse and sometime conflicting empirical evidences in cross-country and country specific FDI-growth nexus, FDI-domestic investment and trade-growth nexus analysis. Among other factors, differences in data used, data measurement and definitions, methodological approaches and time frame have been identified as major responsible for these differences.

In Bangladesh, a very few research works have been conducted on this specific field. The results of those studies are also controversial and debatable issue. The variables and the methodology used in those studies are very traditional and limited. Thus, there is a tremendous scope to work on the same lubricated issue in Bangladesh with improved econometric models and methodologies that could help the policy makers in this regard. Hence, the necessity of the research work has a significant importance in the perspective of the country's need.

## 1.8 Methodology

Methodology includes underlying principles and rules of organization of a philosophical system or inquiry procedure. However, it denotes the detail framework of the unit of analysis, data gathering techniques, sampling focus and interpretation strategy and analysis plan (Abedin, 2005, p. 51). Hence, the methodology of the study consists with the study area, sampling, data and data sources, data collection and analyzing techniques, reliability and validity of the study etc.

### 1.8.1 The Data and Its Sources

The data for this study have basically been collected from the secondary sources as the variables of this study are all in the macro form. The data sources of these macro variables are:  the Statistical Yearbook of Bangladesh published by Bangladesh Bureau of Statistics, Bangladesh Economic Review of various years published by the Ministry of Finance, Bangladesh Economic Survey, published by the Government of Bangladesh, and Economic Indicators published by the Bangladesh Bank. Data of this study have been obtained majorly from the database of the World Development Indicators (WDI) published by the World Bank and the Direction of Trade Statistics (International Monetary Fund). Other sources of data have also been used for the requirement of the estimations.

### 1.8.2 Data Requirements

Since, all the relevant variables in the domestic investment, FDI and trade openness and growth functions are the macroeconomic in nature; the secondary data are obviously required to estimate the functions. For the estimation of this study, the variables that have been used are: stock of labour, domestic investment proxy for domestic capital formation, FDI, trade openness and their various components at the disaggregated level. Again, to show the long run causal relationship among domestic investment, FDI, trade openness and economic growth, the simple time series data of the relevant variables are required. This is why; secondary data have basically been used in this thesis. The collected data have frequently been transformed and generated in accordance with the requirement of the econometric analysis that has made the study more valid and reliable. 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.  A complete econometric analyzing technique has been carried out in order to estimate the function and to notice short run dynamics to the long run equilibrium among FDI, domestic investment, trade openness and economic growth in Bangladesh. Official data sources have primarily been used, supplemented where necessary by other sources. In this case, the data of current prices have also been used for the incumbent of the econometric analysis.

### 1.8.3 Area Selection

The area of the study is the whole country with the disaggregated level discussion of domestic investment, foreign direct investment, trade openness and economic growth. Among many other fields, only domestic investment, FDI, trade openness and their contributions to GDP of Bangladesh are the researchers’ studying field. In order to know the present states of domestic investment, FDI and trade openness and their different components that affect these variables, Bangladesh has also been the study field of this research. This is why; aggregate data on domestic investment, FDI, trade openness and their various components as well as the economic growth in Bangladesh at the disaggregated level are the research area of this study. The sample of this study has covered forty two (42) annual observations (1972-2013).

### 1.8.4 Model Specification

Most of the models of economic growth focus primarily on the basic factors of production- i.e. the capital stock and the labour force. Natural resource endowments, including land, sometimes are incorporated as a third factor of production but most often are subsumed as part of the capital stock. 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 fulfill the research gap and estimation of the regression functions.

### 1.8.5 Empirical Design

This study seeks to assess the impact of and to trace the relationship among FDI, domestic investment, trade openness and economic growth at the disaggregated level in the context of Bangladesh over the period 1972-2013. In doing so, it has been considered changes in real GDP as an indicator of economic growth. FDI has been standardized by GDP to remove the problem associated with absolute measurement. Domestic investment has been used as the proxy of gross capital formation of the economy (Adhikary, 2011; Sumei et al. 2008). Capital formation has been expressed as a percentage of gross fixed capital formation over GDP (Ghali & Al-Mutawa, 1999; Levine & Renelt, 1992; Barro, 1991). Trade openness has been measured by the ratio of export and import over GDP (Gries et al. 2009; Yanikkaya, 2003). This study further examines the effects of different components of domestic investment, FDI, and trade openness as well as the relationships associated with them in Bangladesh. In this case, the pre-estimation techniques (the Chow test, the Copoock Instability Index, the Jarque Bera test, statistical description and the correlation matrix) have been applied.  The stationarity of the data have been tested with the correlogram, the ADF, the D-F (GLS) and the Phillips-Perron tests.  Johansen

Maximum Likelihood method has been applied for cointegration test. For estimating the functions, the popular ordinary least squares (OLS) method has been applied. Vector error correction modeling (VECM) is used to know the long and short run causality as well as to know the short run dynamics to the long run equilibrium for the study. Vector auto regression (VAR) model has been used for analyzing long and short run elasticities of the function. The impulse response analysis (IRA) and variance decomposition method have also been analyzed in this study. For the robustness of the results, different diagnostic tests (L-M test, B-G test, WGH test, CUSUM and CUSUMSQ test) have also been applied. Data of the concerned variables have been performed and analyzed with the popular Econometric Software Eviews 5.1 to 7.1. For graphical and tabular analysis, Office Excel 2007 and SPSS-17.1 have also been used in this study.

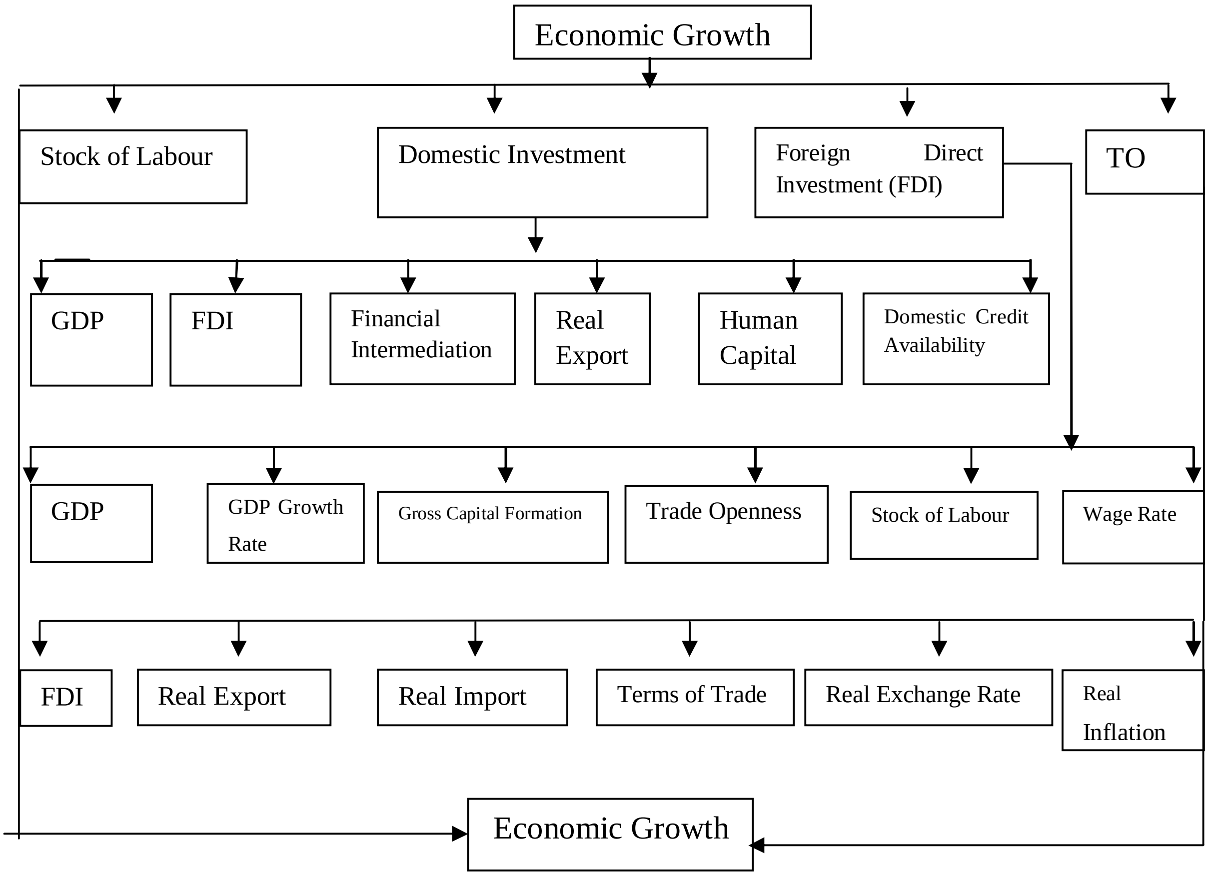
### 1.8.6 Reliability and Validity

The empirical investigation has been carried out with a time series data for the period 1972 to 2013. This study uses the secondary data which have been collected from the World Development Indicators, Bangladesh Economic Reviews, Statistical Yearbook of Bangladesh, Bangladesh Bureau of Statistics, Bangladesh Economic Survey and various budgetary documents on the relevant field. The reliability of the data can be attributed to the fact that all the data used in this study are from the government and the world famous international sources. Thus, data are reliable and valid for policy research. The data of the variables used in this study are in the constant term (current term has also been used for the incumbent of the econometric analysis) and in US $ term. This is because of avoiding inflationary effect in the data as well as the World Bank makes its data bank in US dollar. Thus, the researcher has taken World Development Indicators as the main source of data for this study. For the estimations, the consistent and improved econometric procedures have been applied in this study. The researcher also attempts to test the direction of causation among these variables. All these make the study reliable and valid for econometric analysis.

## 1.9 Disaggregated Structure of the Study

The study follows the whole gamut of the investment (domestic plus foreign), trade openness and economic growth in Bangladesh. The disaggregated analysis of the issue can be shown by the Flow Chart 1.9.1:

**Flow Chart 1.9.1: Disaggregated Structure of the Study**




The Flow Chart 1.9.1 highlights the entire structure of the study that is, the variables of the GDP growth function and their different components at the disaggregated level. Among various components of domestic investment, FDI and trade openness, only those variables have been considered of which have the systematic effect and those have the availability of data for estimating the functions at the disaggregated level in Bangladesh. That means, Economic growth is the function of stock of labour, domestic investment, FDI and trade openness. Domestic investment, FDI and trade openness in Bangladesh on the other hand, are functionally related to their disaggregated components.

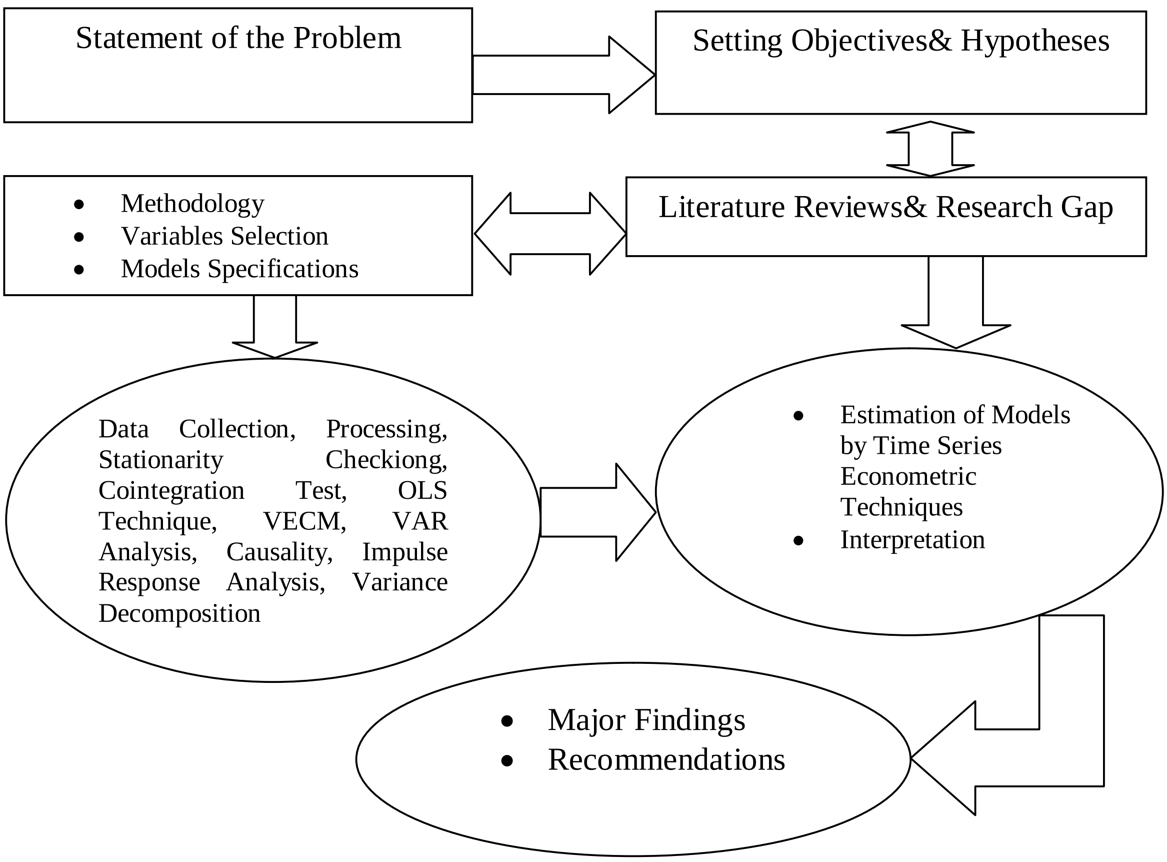
## 1.10 Limitation of the Research

A very long span of time series data gives more consistent results. But, it is a fact that data of the relevant variables of only 42 years (1972-2013) have been used in this study. In case of some variables, this range of the data is also unavailable in Bangladesh. Moreover, the concept domestic investment, FDI inflow, trade openness and economic growth are the macroeconomic form and they have multidimensional aspects. So, many other variables are also related to them. Some of them are estimable econometrically while some of them are not directly measurable in econometrics. With the availability of data and convening with the model and methodologies, only very few variables have been considered for the estimation of the different functions. The study has been tried to explain the nature, cause and effect of domestic investment, FDI, trade openness and economic growth at the disaggregated level in Bangladesh. There are some relevant variables, which are also believed important for their effect on the issue for Bangladesh i.e. local market, transportation, migration, political stability, natural disasters, corruption, investment friendly environment and other transitory phenomena such as measurement errors have been remained beyond the scope of the study. However, if it were possible to cover other relevant variables related to the issue, the area of the study would have been selected from different countries of the South Asia; the research work would have been more enriched.

### 1.11 Research Diagram for the Study

The research process of this study is shown by the following chart as directed by Abedin, 2005, pp. 50:

**Flow Chart 1.11.1: A Diagram of the Research Design for the Study**



### 1.12 Organization of the Thesis

This thesis comprises with eleven chapters, an appendix and a bibliography with handsome references. The brief organizational analysis is:

Chapter One, discusses the introductory analysis of the issue that is, the problem statement, the research gap, the research questions, the objectives, the testable hypotheses, justification of study, the data and the methods, the limitation, organization of the thesis etc. that is, the overall organizational framework of the thesis has been briefly discussed throughout this chapter so that reader can have a concrete idea about the whole thesis.

Chapter Two, critically reviews some previous literature related to domestic investment, FDI, trade openness and economic growth for international as well as Bangladesh perspectives. Through critically analysis of this chapter, the core research gap has been identified.

Chapter Three, highlights the theoretical issues of domestic investment, FDI and trade openness to the economic growth conceptually. It also discusses the relationship among these variables with their various components at the disaggregated level. This chapter also discusses the variables of the concerned issues with the arguments in favour of taking them under consideration. The economic models related to the issue have also been specified in this chapter.

Chapter Four, explains the current trend and pattern of the issue in Bangladesh over the period. This chapter consists with three separate Sections: Section one, states the present trend and pattern of domestic investment in Bangladesh; Section two, describes the current trend and pattern of FDI inflows in Bangladesh; and Section three, presents the current trend and pattern of trade openness in Bangladesh. The policies, the cost-benefits etc. regarding the issue are also discussed throughout this chapter.

Chapter Five, explains the data nature of the variables of domestic investment, FDI, trade openness and GDP growth functions at the disaggregated level with tabular and graphical forms.

Chapter Six, discusses the complete econometric methodology regarding the issues. This chapter explains the estimable domestic investment, FDI and trade openness functions. The pre-estimation techniques (the Chow test, the Coopock Instability test, the J-B test, the correlation matrix etc.) the unit root tests (the ADF, the D-F (GLS), the correlogram, and the PP tests), the Johansen Maximum Likelihood test, Ordinary Least Squares method, the VECM, the VAR model, Granger causality test, the Impulse Response Analysis and the Variance Decomposition analysis have been explained successively. For model diagnostic the Lagrange Multiplier test, the Breusch-Godfrey test, White General Heteroscedasticity test, the CUSUM and CUSUMSQ tests have also been analyzed throughout this chapter.

Chapter Seven, highlights the empirical findings of the domestic investment function at the disaggregated level. The results include the structural break point, instability of the data series, normality of the data, the correlation among the variables; the stationarity of the data, the cointegrating relationships, impact of different components on domestic investment, the elasticities, the short and long run causalities, the impulses of the response variables with their variance decompositions and the model diagnostics.

Chapter Eight, presents the empirical findings of the FDI function at the disaggregated level. The findings include the structural break point, instability of the data series, normality of the data, the correlation among the variables; the stationarity of the data, the cointegrating relationships, impact of different components, the elasticities, the short and long run causalities, the impulses of the response variables with their variance decompositions and the model diagnostics for the FDI function in Bangladesh.

Chapter Nine, analyzes the empirical findings of the trade openness function at the disaggregated level. The empirical findings maintain the related objectives and the hypothesis at 0.05 levels of significance.

Chapter Ten, examines the impact of domestic investment, FDI and trade openness on economic growth in Bangladesh. It also examines the short and long run causal relationships associated with them. The results include the structural break point, instability of the data series, normality of the data, the correlation among the variables; the stationarity of the data, the cointegrating relationships, estimation of the growth function with OLS method, the short and long run elasticities with VAR model, the short and long run causalities with VECM and Granger Causality test. The impulses of the response variables with their variance decompositions have been analyzed. The model diagnostics of the growth function for Bangladesh have also been analyzed.

Chapter Eleven, summarizes the overall empirical findings in accordance with the meeting up the objectives of the study. This chapter also recommends some policies for domestic investment, FDI, trade openness and GDP growth in Bangladesh segregatedly for the policy makers of the concerned authorities. It then draws a conclusion of the thesis and shows a scope for further research on the issue. Finally, this thesis contains an appendix and a handsome bibliography.

### 1.13 Conclusion

This chapter incorporates the introductory background of the thesis. The problem statement, the justification of the study, research gap after reviewing the literatures, research questions, the objectives of the study, the testable hypotheses; limitations, the data, models and empirical design etc. have been briefly discussed throughout this chapter. Finally this chapter summarizes the overall organizational structure of the whole thesis so that one can get a complete idea about the theme of the whole thesis.

# Chapter Two: Survey of Literature

## 2.1 Introduction

Researches conducted on domestic investment, foreign direct investment and how they lead to economic growth through trade openness channel have been critically reviewed in this chapter. Researches that are taken place before on the same issue have been discussed from the developed and developing countries including Bangladesh perspectives. The contexts of the previous studies, the objectives, the concerned variables, the adopted methodologies, the data span, model selection for estimation etc. have been critically explained throughout this chapter. The literature has been reviewed from manuscripts (MPhil. and PhD. thesis), articles, journals, case study and empirical studies on developed and developing countries. Especially, critically reviews of literature on the economy of Bangladesh have been given more emphasis.

## 2.2 Review of the Literature

Only after reviewing the related literature, a researcher can answer the question of what information is already available and what the knowledge-gap is. For this, it has studied a number of research works on supporting the relationship among domestic investment, FDI, trade openness and economic growth. Because, the rapid growth of FDI and its overall magnitude had sparked numerous studies about the issue whether domestic investment, FDI, and trade openness are really fuel up the economic growth or not. This chapter has reviewed the existing literatures on the topic. They can be grouped into three strands. One strand has focused on the developed countries while other strand has focused on the developing countries. The rest strand has focused on the economy of Bangladesh. These are as follows:

### 2.2.1 Evidence Related to the Developed Countries

#### 2.2.1.1 Evidence with FDI and Growth

Herzer (2010) examines the impact of outward foreign direct investment (FDI) on economic growth. Two econometric approaches are used: cross-country regressions for a sample of 50 countries and time-series estimators for the USA. Both approaches tell the same story: outward FDI is positively associated with growth. In addition, Granger-causality tests for the USA indicate that causality is bidirectional, suggesting that increased outward FDI is both a cause and a consequence of increased domestic output.

Hejazi et al. (2003) develops hypotheses linking the impact of FDI to the underlying motivation for investment. These hypotheses are tested using available Canadian industry-level data. The implication of the results is that rapid growth in outward FDI, relative to inward growth, should not be considered as a negative development and may reflect success.

Alfaro et al. (2000) finds that FDI promotes economic growth in economies with sufficiently developed financial markets. It may reduce the savings and thus, less domestic investment which may result in the reduction in growth.

#### 2.2.1.2 Evidence with FDI, Trade and Growth

Schneider (2005) examines the role of high-technology trade, IPRs and FDI in determining a country's rate of innovation and economic growth. Results show that high-technology imports are relevant in explaining domestic innovation; foreign technology has a stronger impact on per capita GDP growth than domestic technology; but the results regarding FDI are inconclusive.

Hubert and Phanindra (2004) examine bilateral foreign direct investments (FDI) among the members of the European Union and eight central and east European candidate (CEEC) economies in transition, awaiting accession into the European Union (EU). Cross section data are obtained for Bulgaria, Czech Republic, Estonia, Hungary, Poland, Romania, Slovak Republic, and Slovenia for 1997. This study reveals that the key determinants of FDI inflows in CEECs are size of the host economy, host country risk, labour costs in host country and openness to trade.

#### 2.2.1.3 Evidence with FDI, Growth and Other Factors

Eller et al. (2006) examine the impact of financial sector FDI (FSFDI) on economic growth via the efficiency channel. They estimate a panel data model for 11 Central and Eastern European countries in a cross-country growth accounting framework over 1996 to 2003. They find a hump-shaped impact of FSFDI on economic growth. Medium FSFDI supports growth if human capital suffices. Above a certain threshold, crowding-out of local physical capital via foreign bank entry slows growth. They combine the FDI-growth and the finance-growth-literature and conclude that the level and quality of foreign investment influences the financial sectors' contribution to growth in emerging markets.

Ghosh and Hendrik (2006) focus on how foreign direct investment (FDI) transfers technology from developed economies to less developed economies. Most FDI occurs between developed economies and the country receiving the greatest inflow of FDI is the United States. They examine whether such FDI inflows have stimulated growth of the U.S. economy. They apply time-series data to a simultaneous-equation model (SEM) that explicitly captures the bi-directional relationship between FDI and U.S. economic growth. FDI is found to have a significant, positive, and economically important impact on U.S. growth. Also, the SEM estimates reveal that FDI growth is income inelastic.

Wadud (2005) examines the long-run relationship between saving and investment in Japan to assess capital mobility with the Vector Autoregression (VAR) approach. He uses data for the period of 1960 to 2003 on Japan to measure domestic saving which is associated with domestic investment. Results of unit root accept the null hypothesis of unit root confirming the short-run instability between saving and investment, but maximum likelihood estimation results accept the null hypothesis of one cointegration vector ensuring a long–run relationship between saving and investment.

Mike and Nikos (2004) attempt to explain the uneven allocation of foreign direct investment in the economies in transition for the most part stress the role of the market as the most significant factor in the attraction of such investment. They attempt to verify empirically the argument that institutional factors. They use a panel data set for the economies in transition, which are to become member states of the European Union. The findings show that market size and degree of internationalization of the host economy explain a significant part of the cross-country variation of foreign direct investment.

Sanjaya and Rajneesh (2004) observe that despite globalization, the essential role of foreign direct investment (FDI) in economic development has not changed. They attempt to place the discussions and issues raised in this special issue of The European Journal of Development Research within the wider literature on FDI and development. They also analyze the policy tools available for using FDI for economic development in a liberalizing, post-World Trade Organization world, and the constraints to doing this.

#### 2.2.1.4 Critical Findings

This subsection is comprised with the review of the literatures concerning with the developed countries of the world. Most of the studies have tried to show the relationship between FDI and economic growth. Some of them have linked FDI with other factors of the economy as: local financial markets, savings, domestic investment, size of the economy, labour costs, trade openness, import of high-technology, etc. Some of them have used country specific and panel time series data. Some of them have linked growth to outward FDI with positive relation in the development perspective. Many of them have used simultaneous equation model (SEM) and others have used autoregressive distributed lag (ARDL) model. But, the results are not the same. Some studies have showed that there is bidirectional causality while others showed the unidirectional causality between FDI and economic growth. Even that they have not used recently improved econometric techniques and models; like VAR models, VECM, impulse response analysis function, model diagnostic, etc. This may also be the gap of this subsection that has been met up by the next successive chapters of this study.

### 2.2.2 Evidence Related to the Developing Countries

#### 2.2.2.1 Evidence of FDI and GDP Growth

Bhavan et al. (2011) investigate the determinants and growth effect of FDI in case of four South Asian countries over the period of 1995-2008. They comprise two major analytical parts. Firstly, they incorporate a gravity model equation in order to investigate potential determinants of foreign direct investment in these countries. Secondly, they use a growth model equation to investigate growth effect of foreign direct investment in the countries. For both analyses, the authors use panel data and employ Arellano-Bond dynamic panel system method of moment estimator. The result indicates that foreign direct investment in South Asian countries is significant and positively associated with growth rate.

Rahman and Shahbaz (2011) investigate the effects of imports and foreign capital inflows on economic growth in case of Pakistan over the period of 1990Q1-2008Q4. They have applied ARDL bounds testing approach to examine the long run relationship and investigated the direction of causality by using VECM multivariate framework. Their analysis confirms the long run relationship between imports, foreign capital inflows and economic growth. The results show that imports and foreign capital inflows have positive and significant effect on the economic growth of Pakistan. Causality analysis reveals bidirectional causal association among the variables, but strong causality is found from imports and foreign capital inflows to real GDP.

Miao (2009) states that empirical studies on inward foreign direct investment (FDI) and economic growth generate mixed results. He studies the heterogeneous effects of different sector-level FDI inflows on host country's economic growth. Data from 12 Asian economies over the period of 1987 to 1997 are employed. He strongly shows that FDI in manufacturing sector has a significant and positive effect on economic growth in the host economies. FDI inflows in non manufacturing sectors do not play a significant role in enhancing economic growth.

Beugelsdijk et al. (2008) contribute to the literature investigating the impact of FDI on host country economic growth by distinguishing between the growth effects of horizontal (market seeking) FDI and vertical (efficiency seeking) FDI. Using a new database, they estimate the growth effects of vertical and horizontal US MNE activity into 44 host countries over the period 1983–2003, also using traditional total FDI figures as a benchmark. Controlling for endogeneity and absorptive capacity effects, they find that horizontal and vertical FDI have positive and significant growth effects in developed countries. Moreover, their results indicate a superior growth effect of horizontal FDI over vertical FDI. They find no significant effects of horizontal or vertical FDI in developing countries.

Chakraborty and Nunnenkamp (2008) assess the proposition by subjecting industry-specific FDI and output data to Granger causality tests within a panel cointegration framework. It turns out that the growth effects of FDI vary widely across sectors. FDI stocks and output are mutually reinforcing in the manufacturing sector, whereas any causal relationship is absent in the primary sector. However, FDI in the services sector appears to have promoted growth in the manufacturing sector through cross-sector spillovers.

Fabienne (2007) explains the empirical evidence on the relationship between FDI and economic growth is still inconclusive. He contributes to the debate by analyzing the differences in the growth consequences of FDI from various countries of origin, using a data set on bilateral investment stocks of six major outward investor countries in 71 host countries for the period 1989-2002. Panel data analysis confirms that the growth consequences of FDI differ by country of origin, and that these countries of origin effects also vary depending on the host country characteristics.

Shujie and Kailei (2006) present and test two propositions on the role of FDI in economic growth from a newly industrializing economy's perspective. First, FDI is a mover of production efficiency because it helps to reduce the gap between the actual level of production and a steady state production frontier. Second, FDI being embedded with advanced technologies and knowledge is a shifter of the host country's production frontier. Due to its dual role as a mover of production efficiency and a shifter of production frontier, FDI is a powerful driver of economic growth for a newly industrializing economy to catch up with the world's most advanced countries.

Yao (2006) discusses that China has achieved high economic growth for a prolonged period of time. He focuses on the effect of exports and foreign direct investments (FDI) on economic performance, using a large panel data set encompassing 28 Chinese provinces over the period 1978-2000. Adopting Pedroni's panel unit root test and Arellano and Bond's dynamic panel data estimating technique, it is found that both exports and FDI have a strong and positive effect on economic growth. The results suggest that two development policies adopted in China are useful for other developing and transitional economies for export promotion and adoption of world technology and business practices.

Alguacil et al. (2005) observe the mixed findings in the FDI-growth nexus literature have heightened the debate about the expected benefits of these capital inflows. They estimate both dynamic panel data and cross-section regressions for a group of emerging countries from Latin America and Asia during the period 1976-2005. The estimation results of the system GMM regression reveal the importance of considering the macroeconomic environment as well as institutional quality factors when evaluating the economic impact of foreign inflows.

Akinlo (2004) investigates the impact of foreign direct investment (FDI) on economic growth in Nigeria, for the period 1970-2001. The ECM results show that both private capital and lagged foreign capital have small, and not a statistically significant effect, on the economic growth. The results seem to support the argument that extractive FDI might not be growth enhancing as much as manufacturing FDI. In addition, the results show that export has a positive and statistically significant effect on growth. Financial development measured as M2/GDP ratio has significantly negative effect on growth, which might be due to high capital flight it generates. Finally, the results show that labour force and human capital have significant positive effect on growth. These findings suggest the need for labour force expansion and education policy to raise the stock of human capital in the country.

Choong et al. (2004) investigate the patterns of foreign direct investment (FDI) and economic growth among selected developed and East Asian countries. In particular, they aim to investigate the development of the domestic financial sector in transferring the technological diffusion embodied in FDI inflows to the chosen countries. Results prove 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.

Nunnenkamp et al. (2004) conclude that the positive growth effects of foreign direct investment are not guaranteed automatically. Host-economy and industry characteristics, as well as the interaction between such characteristics affect largely the growth impact of foreign direct investment in developing economies.

Hermes and Lensink (2003) argue that the development of the financial system of the recipient country is an important precondition for FDI to have a positive impact on economic growth. A more developed financial system positively contributes to the process of technological diffusion associated with FDI. They empirically investigate the role the development of the financial system plays in enhancing the positive relationship between FDI and economic growth. Of the 67 countries in data set (most of these countries are in Latin America and Asia), 37have a sufficiently developed financial system in order to let FDI contributed positively to economic growth.

Borensztein et al. (1998) test the effect of foreign direct investment (FDI) on economic growth in a cross-country regression framework, utilizing data on FDI flows from industrial countries to 69 developing countries over the last two decades. Their results suggest that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment. However, the higher productivity of FDI holds only when the host country has a minimum threshold stock of human capital. They conclude that FDI contributes to economic growth only when a sufficient absorptive capability of the advanced technologies is available in the host economy.

#### 2.2.2.2 Evidence of FDI, Trade Openness and Economic Growth

Shahbaz (2012) investigates effect of trade openness on economic growth in the long run. He applies the ARDL bounds testing approach to test for a long run relationship and the augmented production function by incorporating financial development as an additional determinant of economic growth using the framework of Mankiw (1992). The results confirm cointegration among the series. In the long run, trade openness promotes economic growth. The growth-led-trade hypothesis is vindicated by VECM Granger causality test.

Alam and Zubayer (2010) state that the empirical literature offers regional integration arrangements that reduces trade costs among partner countries. This reduction in cost not only increases trade but also acts as a stimulus to increase FDI flow. Their major focus is on SAARC economic integration and FDI status. The finding is the very low level of intra-regional trade (less than 5% and in case of FDI, the major source is outward flow than intra-regional flow.

Zambe and Yue (2010) examine the long-run impact of foreign direct investment and trade openness on economic growth in Cote d'Ivoire. To assess this purpose, they use the more recent data analysis technique the bounds testing cointegration approach (Pesaran *et al*, 2001) and the VAR Granger causality/Block Exogeneity Wald tests. The data span for the study is from 1980-2007. Amongst the key results they found: a long run relationship between the foreign direct investment, trade openness and output; and the VAR Granger causality/Block Exogeneity Wald tests reveals unidirectional causal relationship running from foreign direct investment, trade openness to output and from output, foreign direct investment to trade openness. They found both foreign direct investment and trade openness are significant in explaining output growth in Cote d'Ivoire.

Yucel (2009) examines the causality relations between financial development, trade openness and economic growth (GDP) for the Turkish economy. In time series context, he uses recently developed econometric techniques: namely the Augmented Dickey-Fuller (ADF) for unit root, Johansen and Juselius (JJ) for cointegration and Granger causality test for causal relationships. The findings of the study show that trade openness have a positive effect; where as financial development has a negative effect on growth. Moreover, the Granger causality test results reveal the presence of bicausal relationship between financial development, trade openness and growth.

Liu et al. (2005) examines empirically the interplay between exports, imports, FDI and economic growth for nine Asian economies by conducting multivariate causality tests in the VECM framework. The results reveal two way causal connections between the four variables for most of the sample economies. These findings suggest that export expansion, import liberalisation and FDI inflows are integral parts of the growth process in Asian economies.

Metwally (2004) develops a simultaneous equations model to test the process of interaction among foreign direct investment, exports and economic growth in three Middle Eastern countries: Egypt, Jordan, Oman, and to test for any possible feedback effects. The simultaneous equations model results suggest that higher rates of economic growth result in a greater inflow of foreign capital. The regression results also suggest that interest rate differentials exert a much stronger effect than economic growth on the attraction of foreign capital in the case of Egypt. However, this variable does not seem to play a significant role in the case of Oman. Moreover, the results suggest that there is a feedback effect in the relationship between economic growth and capital inflow in all sample countries.

Bengoa and Blanca (2003) explore the interplay between economic freedom, foreign direct investment (FDI) and economic growth using panel data analysis for a sample of 18 Latin American countries for 1970-1999. They find that economic freedom in the host country is a positive determinant of FDI inflows. Their results also suggest that foreign direct investment is positively correlated with economic growth in the host countries. The host country requires, however, adequate human capital, economic stability and liberalized markets to benefit from long-term capital flows.

Balasubramanyam et al. (I996) examines that the role which foreign direct investment (FDI) plays in the growth process in the context of developing countries characterized by differing trade policy regimes. They test (using cross-section data relating to a sample of forty-six developing countries) the hypothesis advanced by Jagdish Bhagwati, according to which the beneficial effect of FDI, in terms of enhanced economic growth, is stronger in those countries which pursue an outwardly oriented trade policy than it is in those countries adopting an inwardly oriented policy.

#### 2.2.2.3 Evidence of FDI, Trade Openness, Other Factors and Growth

Jadhav (2012) explores the role of economic, institutional and political factors in attracting foreign direct investment (FDI) in BRICS (Brazil, Russia, India, China & South Africa) economy and the comparative weightage of these factors in attracting FDI. He uses panel data for a period of ten years (2000-2009) in order to examine the significant determinants of FDI in BRICS from a holistic approach. Analysis has been done using panel unit-root test, and multiple regressions. Findings indicate that economic factors are more significant than institutional and political Factors in BRICS economies.

Hye (2011) constructs a financial development index (FDI) for the Indian economy and also examines the relationship between FDI and economic growth. Augmented Dickey Fuller, Phillips Perron and Ng Perron unit root tests are employed in order to determine the level of integration. The long and short run dynamics are obtained by using auto-regressive distributed lag approach to cointegration and rolling window approach to estimate coefficient of each observation. The results indicate that long run relationship is presented among the economic growth, FDI, real-interest rate (RIR), labor force and capital. But FDI negatively associated with economic growth in the case of long and short run and RIR also negatively determine the economic growth only in the long run.

Khalid et al. (2011) empirically examine the impact of economic growth and income inequality on poverty for a panel of five selected SAARC countries over the period of 1988-2009. There is no consensus on the growth, inequality and poverty (GIP) relationship in the SAARC region. The results of pooled least square method reveal that if there is one percent increase in economic growth reduces poverty by 0.05 percent. Public spending on education and foreign direct investment has shown a positive impact on poverty reduction process. Trade openness and increase in healthcare expenditure has found to be insignificant on poverty reduction. By using the fixed effect model, results reveal that poverty ratio in the five SAARC countries is apparently influenced by country specific effects.

Chaponnière and Cling (2009) state that the emergence of China has raised some doubts concerning the possibility for new Asian countries to take off and join the group of emerging countries. They address this question in the case of Vietnam, which has been following China's path closely and very successfully during the last two decades. They show that Vietnam's and China's export structures are very different and that China is not "crowding out" Vietnam for textile & clothing products on the US market. In the long term, a major challenge for Vietnam is to diversify exports and take part in the regional production network.

Kok and Bernur (2009) investigate the best determinants of foreign direct investment (FDI) in developing countries. They investigate whether FDI determinants affect FDI based on both a panel of data (FMOLS-fully modified OLS) and cross-section SUR (seemingly unrelated regression) for 24 developing countries, over the period 1983-2005 for FMOLS and 1976-2005 for cross-section SUR. The interaction of FDI with some FDI determinants have a strong positive effect on economic progress in developing countries, while the interaction of FDI with the total debt service/GDP and inflation have a negative impact.

Tang et al. (2008) investigate the causal link between foreign direct investment (FDI), domestic investment and economic growth in China for the period 1988-2003. Towards this purpose, a multivariate VAR system with error correction model (ECM) and the innovation accounting (variance decomposition and impulse response function analysis) techniques are used. The results show that while there is a bi-directional causality between domestic investment and economic growth, there is only single-directional causality from FDI to domestic investment and to economic growth. Rather than crowding out domestic investment, FDI is found to be complementary with domestic investment. Thus, FDI has not only assisted in overcoming shortage of capital, it has also stimulated economic growth through complementing domestic investment in China.

Carsten (2005) explores the linkages between political risk, institutions and foreign direct investment inflows. Using different econometric techniques for a data sample of 83 developing countries and the period 1984 to 2003, he identifies those indicators that matter most for the activities of multinational corporations. The results show that government stability, the absence of internal conflict and ethnic tensions, basic democratic rights and ensuring law and order are highly significant determinants of foreign investment inflows.

Liua et al. (2005) explore that China's development path has been widely recognized as being unique, with gradual privatization and mercerization, massive private capital inflows, and extensive exporting. They draw attention to a new emerging phenomenon-significant Chinese level of outward FDI (OFDI) and take a first step towards understanding this development at an aggregate level. To address these however, exogeneity tests reveal a need to use GMM estimation methods rather than straightforward regressions, since relations between economic development and OFDI are complex and inter-dependent. The GMM results suggest that the level of economic development, proxied by GDP per capita plus refinements, is still the main factor explaining China's rate of OFDI.

Kim and Seo (2003) provide empirical evidence on the dynamic relationship between inward foreign direct investment (FDI), economic growth and domestic investment in Korea for the period 1985-1999. By employing a vector autoregression model and the innovations accounting techniques, they explore dynamic interactions between inward FDI, domestic investment and output. They find that FDI has some positive effects on economic growth, but its effects seem to be insignificant. On the other hand, economic growth is found to have statistically significant and highly persistent effects on the future level of FDI. Although FDI is exogenous contemporaneously, they find that FDI shows strong dynamic endogeneity to domestic macroeconomic conditions, which has not been uncovered in previous works. Their finding does not support the view that FDI crowds out domestic investment in Korea.

Liu and Sinclair (2002) investigate the causal links between trade, economic growth and inward foreign direct investment (FDI) in China at the aggregate level. The integration and cointegration properties of quarterly data are analyzed. Long run relationships between growth, exports, imports and FDI are identified in a cointegration framework, in which this paper finds bi-directional causality between economic growth, FDI and exports. Economic development, exports and FDI appear to be mutually reinforcing under the open-door policy.

Xu (2000) investigates US multinational enterprises MNEs as a channel of international technology diffusion in 40 countries from 1966 to 1994. He uses data on technology transfer to distinguish between the technology diffusion effect and other productivity-enhancing effects of MNEs. He finds that the technology transfer provided by US MNEs contributes to the productivity growth in DCs but not in LDCs. He shows that a country needs to reach a minimum human capital threshold level in order to benefit from the technology transfer of US MNEs. Most of the LDCs however do not meet this threshold requirement.

Laura et al. (2004) examine the various links among foreign direct investment, financial markets and growth. They model an economy with a continuum of agents indexed by their level of ability. Agents have two choices: they can work for the foreign company in the FDI sector and use their wealth to earn a return or they can choose to undertake entrepreneurial activities, which are subject to a fixed cost. Better financial markets allow agents in the economy to take advantage of knowledge spillovers from FDI. The empirical evidence suggests that FDI plays an important role in contributing to economic growth. However, the level development of local financial markets is crucial for these positive effects to be realized.

Soto (2000) analyzes the effects of the different components of private capital inflows on the growth of 44 developing countries. A dynamic panel with yearly data is estimated during the 1986-97 period. After controlling for the variables traditionally used in growth regressions, the following main conclusions emerge. First, foreign direct investment and portfolio equity flows exhibit a robust positive correlation with growth. Second, portfolio bond flows are not significantly linked to economic growth. Finally, in economies with undercapitalized banking systems, bank-related inflows are negatively correlated with the growth rate.

Yanrui (2000) distinguishes FDI from other forms of investment by its ability to transfer not only production know-how but also other technical, managerial and marketing skills. Within the new growth framework, he attempts to investigate the performance of foreign direct investment, i.e. how efficient FDI as one of the factor inputs in an economy has been utilized. In the empirical analyses, an input-oriented distance function approach is employed to estimate the technical efficiency of FDI in China's coastal regions over the period 1983–1995. Results show that FDI brings into the host countries tremendous externalities, namely, promotion of competition, and technical progress through investment in R&D, and through specialization.

Burt (1997) describes that no single comprehensive set of multilateral rules currently exists for the regulation of foreign direct investment. Foreign Direct Investment and The WTO direct investment because they view restrictive investment policy as a sovereign right and an element of national economic policy.' They fear abuse by multinational enterprises and a loss of sovereign control over national development if investment policies are liberalized. Developing country attitudes toward FDI have changed since the end of the Uruguay Round and many now actively pursue direct investment. Developing countries, however, still have concerns over restrictive MNE practices and diminished control over national development.

#### 2.2.2.4 Critical Findings

In this subsection, literature concerning with the developing countries of the world is reviewed critically. Most of the studies have tried to show the relationship between FDI and economic growth; FDI, capital formation and economic growth; FDI, trade and economic growth while some of them have showed the effects and determinants of FDI and trade openness. Some of them have linked FDI with other factors of the economy as: local financial markets, savings, domestic investment, nature of the economy, labour costs, export-import, domestic demand, exchange rate, etc. Some of them have used country specific and cross country panel time series and in some cases, cross section data have been used. Many of them have, used simultaneous equation model (SEM) and others have used (ARDL) autoregressive distributed lag model as well as VAR model. A very few of them have used Granger causality, VECM test. But, most of the cases, the results are different to each other. Some studies have showed that there is bidirectional causality while others have showed the unidirectional causality between FDI and economic growth; trade openness and economic growth. Besides, FDI and trade openness have shown the controversial results on economic growth in the developing countries. They have not yet used recently improved econometric techniques and models like, normality test of the data, variance decomposition and impulse response analysis function, model diagnostics, up to date data, etc.

### 2.2.3 Evidence Related to Bangladesh Economy

#### 2.2.3.1 Evidence of FDI, Domestic Investment and Growth

Hossain and Kamal (2012) examine co-integration and the causal relationship between Foreign Direct Investment (FDI) and the economic output or Gross Domestic Product (GDP) in the both short and long run of Bangladesh, Pakistan and India over the period of 1972-2008. Three econometric models, viz. Augmented Dickey-Fuller (ADF) test, Engle-Granger two-step co-integration test, Vector error correction mechanism (VECM) have been used. This study also uses Granger Causality (GC) to find the directional relationship between FDI and GDP. The results suggest that there is no co-integration between FDI and GDP in the both long and short run in Bangladesh and India. However, they find the co-integration between them in the both short and long run in Pakistan. Conversely, GC results suggest that there is no causality relationship between GDP and FDI for Bangladesh and one way or unidirectional relationship is found for Pakistan and India, which means FDI, causes economic output in Pakistan.

Ahamed and Fahian (2010) state that FDI inward to the middle-income countries have the evidence for export-oriented manufacturing sector as a major stimulus to the economic growth. In point of fact, basic macro fundamentals like as growth of gross domestic capital formation, foreign reserve, infrastructure etc. accelerates the FDI inflows. They review the long-run trend on the time scale of FDI to Bangladesh over the period 1975-2006 and major factors determining foreign companies' decisions to invest, in associated with economic growth. Results show that reduced government’s ineffectiveness along with supporting policy framework makes Bangladesh as an attractive destination of FDI that has a positive spillover and significant impact over time through dynamic effects on economic growth.

Quazi and Munir (2009) analyze recent trends in capital inflows as measured by Foreign Direct Investment (FDI) for selected economies in South Asia - Bangladesh, India, Pakistan and Sri Lanka. Using a panel regression model, they find that inward FDI in these sample economies is significantly enhanced by foreign investors' familiarity with the host economy and better infrastructure, and the inflow is significantly depressed by the lack of economic freedom and increased political risk.

Shafiun et al. (2009) attempt to find the long run cointegrating relationships between foreign direct investment and economic growth of Bangladesh using time series data 1973-2007. For testing cointegration, the two modern time series econometric approaches-bound testing Autoregressive Distributed Lag (ARDL) Model and Engle Granger two step procedures-are executed and they find that FDI and GDP are not cointegrated. Moreover, using Granger Causality test it is shown that the FDI and openness are not significantly causing the GDP per capita both in the short and long run.

Qamarullah (2007) analyzes the relationship between economic growth and private investment for the case of Bangladesh. He finds that the economy of Bangladesh had a steady growth of both GDP and private investments for the period 1981 to 2002. The result also indicates that there is a unidirectional causal relationship running from economic growth to private investment growth for Bangladesh.

Islam et al. (2005) observe that the economy of Bangladesh has a steady growth of GDP and investments between 1974 and 2003. They first examine the stationarity property of GDP and investment and then examine the relationship between economic growth and investment in Bangladesh with the help of cointegration and Granger causality tests. The results indicate that there is a unidirectional causal relationship running from economic growth to investment for Bangladesh for the period under consideration.

Matin (1987) attempts to obtain the effect of foreign capital inflow on domestic saving and the rate of growth, using the time series aggregate data during the period 1972/73 to 1982/83. The result reveals that the effect of foreign capital inflow on domestic saving is very sensitive to the types of deflation and also the methods of estimation employed. It is observed that positive effect of foreign capital inflow rate is no longer statistically significant. The effect of foreign capital inflow on rate of growth also seems to vary according the methodology of estimation.

Ahmed (1985) finds out the effort of foreign capital inflow on domestic savings. A time series data for the period of 1960/61-1979/80 are used for the study. The result reveals that foreign capital inflow has a positive effect on the non-corporate private savings through increasing household income by food assistance under PL-480, Food for Work Programme, Rural Works programme and different foreign aided project assistance which are also generated rural employment opportunity.

#### 2.2.3.2 Evidence of FDI, Trade and Growth in Bangladesh

Humayara et al. (2012) assess the impact of trade liberalization on Bangladesh economy between the periods 1980 to 2010. They use simple Ordinary Least Squares (OLS) technique as methodology for empirical findings. The analysis clearly indicates that GDP growth increased consequent to liberalization. Both real export and imports have increased with greater openness. Liberalization policy certainly improves export of the country which eventually leads higher economic growth after 1990s.

Moniruzzaman (2011) reviews the pre-trade liberalization policies and progress; examines the trade liberalization process and policy measures; identifies the factors affecting the export and import; finds out causal relationship between trade liberalization and export, import, balance of trade; explores overall effect of trade liberalization on trade performance and identifies the challenges and opportunities of trade liberalization. The methodology of the study follows both traditional statistical approach and modern time series econometric modeling such as cointegration, Engle-Granger causality, vector error correction modeling and vector Auto-regressive model etc. The findings are the exports of Bangladesh in pre-liberalization period are more instable as compared to post-liberalization period. It further reveals that relative price of export does not Granger cause to real export supply but the real export supply has Granger cause to relative price.

Paul (2011) observes that Bangladesh with spectacular growth in both exports and output in recent years has drawn attention to the hypothesis of export-led growth. The results on this hypothesis are nevertheless inconclusive. By selecting a relatively liberalized regime from 1979 to 2010, he engages both the Johansen cointegration approach and innovation accounting with Bangladesh’s output, exports, and imports. This comprehensive approach finds significant evidence on export-led growth in Bangladesh for both the long run and the short run. He also finds that output growth leads to export expansion.

Hossain and Alauddin (2005) examine the process of Bangladesh's trade liberalization and its impact on the growth and structure of exports, imports, GDP and other relevant macroeconomic variables with particular emphasis on exports. Various indicators of trade liberalizations show a substantial shift of the Bangladesh external trade regime and the resultant reduction in anti-export bias. An empirical investigation based on a distributed lag modeling and cointegration suggests that both anti-export bias reduction and import-GDP ratio, the latter being a proxy for imported capital, have significantly impacted on exports in the long run.

#### 2.2.3.3 Evidence of FDI, Other Factors, Trade Openness and Growth

Hossain (2013) empirically investigates the policy regime shift in Bangladesh from import substitution to export promotion. The structural malaise gripping the economy during the 1970s and the early 1980s, and the policy reforms aimed at rectifying it are critically analysed. The methodology of the anti-export bias enunciated by Bhagwati and Krueger is applied to evaluate the success of the trade policy reforms implemented in Bangladesh. He undertakes a deeper investigation of the performance of the manufacturing sector of Bangladesh by examining the technical efficiency of the various three-digit level manufacturing industries. He finally, concludes by reviewing the welfare implications of trade liberalisation by focusing on personal income distribution, wage disparity in the manufacturing sector and poverty.

Adhikary (2012) investigates the impact of foreign direct investment (FDI), trade openness, domestic demand, and exchange rate on the export performance of Bangladesh over the period of 1980-2009 using the vector error correction (VEC) model under the time series framework. The stationarity of the variables is checked under the ADF and PP stationarity tests. The Johansen-Juselius procedure is applied to test the cointegration relationship between variables followed by the VEC regression model. The empirical results trace a long run equilibrium relationship in the variables. FDI is found to be an important factor in explaining the changes in exports both in the short run and long run. However, the study does not trace any significant causal relationship for the cases of trade openness, domestic demand and exchange rate.

Rahman (2007) shows that the export growth rates of Bangladesh are higher than that of the SAARC countries. However, the balance of trade of Bangladesh is always in deficit and the trade deficit with India is huge. The export share of primary commodities has decreased while that of manufactured commodities has increased over the years. The growth rate of manufactured commodities is better than that of primary commodities. The import share of principal primary commodities has declined while that of principal industrial and capital goods has slightly increased over the past years.

Noman (2002) shows the nature and extent of the incentives trade policy liberalization could provide on the way to further boost the economy in general and the agricultural sector in particular. The study constitutes of two methodological approaches, firstly, the interview of the farmers and concerned officer about the agricultural liberalization. Secondly, a computable equilibrium model for the Bangladesh economy is developed and with the help of the model 7 different economic policy and shock scenerios are stimulated. The findings from the field study suggest that the foodgrain production, especially rice, has increased. Model results indicate that by reducing tariffs, domestic output increases in almost all the sectors but government revenue and savings decline significantly. Exports also increase showing the justification of the liberalization and also supporting the argument that tariffs bias exports. But the increase in total import is bigger than the increase in exports which causes a deterioration of the real balance of trade.

Sobhan and Bhattacharya (1987) focus on the perceptions of the aid donors towards private foreign investment (PFI) policy in Bangladesh and the perceptions of the investors towards public policy as it impinged on PEE. Attempt is made to see how far policy changes consisted with the perceptions and preference of donors and private foreign investors in this critical area. In the first section of the paper, comparative analysis of the aims and objectives of the investors and donors is attempted. In the second section, they attempt to evaluate the responses of private foreign investors to different policy packages offered by the GOB and sought to identify the factors determining their preferences

#### 2.2.3.4 Critical Findings

Literature concerned with Bangladesh economy has been critically reviewed in this subsection. Most of the studies have tried to show the relationship between FDI and economic growth; FDI, capital formation and economic growth; FDI, trade and economic growth in Bangladesh while some of them have showed the effects and determinants of FDI and trade openness. Some of them, have linked FDI with other factors of the economy, such as, savings, capital formation, domestic demand, exchange rate, trade liberalization, etc. in Bangladesh. Many of them have, used Vector Error Correction Modeling and others have used (ARDL) autoregressive distributed lag model. Most of them have used cointegration and Granger causality test. But, sampling (data ranging), models and econometric techniques they used, are not the same in their studies. Therefore, the results are not the same. Most of them have showed that there are bidirectional causalities while others showed the unidirectional causality between FDI and economic growth as well as trade openness and economic growth in Bangladesh. Again some of them have not any causality among the variables. No studies have yet examined the linkage among domestic investment, FDI, trade openness and economic growth as well as their different components associated with them at the disaggregated level in Bangladesh. Again, they have also not used recently improved econometric techniques and models like, normality test of the data, variance decomposition and impulse response analysis function, model diagnostics, up to date data, related economic models, as well as the newer version of econometric software which are the research gap of this study.

### 2.3 Benefits of Domestic Investment, FDI, Trade Openness and Economic Growth

The study contributes to the existing investment, FDI, trade, economic and finance literatures of developed and developing countries. The contribution of this study carried out by the earlier studies that can be explained in the following ways. First, the study deals with one of the emerging economies in South Asia, Bangladesh that practices democracy and market oriented policies to enhance economic growth. Second, a country specific study removes the country specific problem and skepticism about the robustness of economic results that are often linked with FDI and growth or trade and growth. Third, the study covers annual time series data from 1972 to 2013 which covers the most recent data as well as a period of extensive economic and financial liberalization measures undertaken by the government to attract FDI in Bangladesh. Fourth, it investigates the effect of FDI and trade openness, on domestic investment and economic growth which is rarely studied in the context of Bangladesh. Fifth, the validity of Solow and Romer model and the relationship among labour stock, domestic investment, FDI, trade openness and economic growth in Bangladesh has not been established in the existing empirical works which to researcher knowledge.

The policy issues have been concerned as to which variables are relatively useful and which factors contribute to reduce dependency on FDI and how the positive effects of FDI and trade openness could be accelerated to improve economic growth in Bangladesh. Again, it is also concerned with the nature of the economy, i.e. how the country can absorb the capital flow of FDI through trade openness channel in the era of free market economy for economic development of Bangladesh. The policy issue has also been concerned with total factor productivity (TFP); whether or not they are better to pursue policies, which introduce new technologies, human capital, education and health as well as infrastructure or those, which increase efficiency of the absorbing capacity of the country.

## 2.4 Utility of the Study

Researcher conducts a research on domestic investment, foreign direct investment, trade openness and economic growth in Bangladesh applying up to date econometric techniques. Since, there remains a major research gap in the existing development literature and this study has been an attempt to fulfill the identified gaps. It incorporates the pre-estimation techniques (the Chow test, the Coppock Instability Index, etc.), the unit root tests (correlogram, ADF, D-F (GLS), and PP tests), the Johansen cointegration tests, OLS method, the Granger causality with VECM (Vector Error Correction Modeling), VAR (Vector Autoregression) model, impulse response analysis (IRA), the variance decomposition and model diagnostics (L-M, B-G, WGH, CUSUM and CUSUMSQ tests). This study has also incorporated neoclassical, endogenous as well as Aggregate Production Function growth models for providing unbiased, consistent and accurate estimators. Neglecting these dynamics of the models may produce various estimation biases, giving rise to misleading analytical results. This study thus, aims at empirically examine the multidimensional issues related to domestic investment, FDI, trade openness and economic growth in Bangladesh. It has been tried to provide the macroeconomic policy recommendations of the concerned issue, reviewing the up to date literature, data and proper econometric findings. This study is thus, an extension of country specific analysis to add knowledge in the existing empirical literature. This study will be a commendable work if completed successfully, because no such an empirical research has so far been carried out in this field. It would also be a guideline for researchers in future for pursuing extensive study on the relevant topic. Besides, this research could show the policy makers in formulating the International Trade policy in Bangladesh. So, it can be said that the proposed study would surely benefit the researchers, students and the policy makers.

## 2.5 Conclusion

A number of empirical works have been conducted on the linkages of domestic investment, FDI, trade openness and economic growth in developed and developing countries. But the study on the issue in developing countries like Bangladesh does not get maturity. Some researchers conducted studies for developing countries including Bangladesh. In those studies, they did not show the relationships between the issue related to domestic investment, FDI, trade openness and economic growth in Bangladesh but they have rather showed the variability of foreign aid and trade liberalization attainments and economic growth as well as their various components. FDI is the key economic factor for economic growth in both developed and developing countries that has shown through the paper reviewed. The objectives of the studies were to review how economic growth would be increased through domestic investment, FDI inflow and absorbing capacity of the host country through trade openness channel. Finally, they have tried to find out the solution of the sustainable economic growth with FDI and trade openness. In this way, the variables they used, data collection and analysis procedures, the methodology they used etc. are discussed both in mathematically and statistically. In order to do so, the case studies or empirical studies are conducted by researchers using different economic models. The studies thus show that as a developing country, the multidimensional aspects of domestic investment, FDI and trade openness can play a vital role in accelerating economic growth in Bangladesh. Yet, there is a tremendous scope of research in the field using a long span of data, economic models, improved econometric methodologies and related macroeconomic variables.

# Chapter Three: Variables, Theories and Model Specification

## 3. Introduction

Investment of a country is one of the key elements of economic growth. It comes from local and foreign sources. Local investment mainly depends on domestic capital formation which is the function of savings (individual plus national savings) of the country. Developing countries like Bangladesh suffers with the scarcity of domestic capital formation because of low level of savings here. Foreign capital often meets up this vacum from the first world countries through multinational enterprises. This capital is known as foreign private direct investment (FDI). It is also one of the principal sources of capital accumulation in the process of economic growth, development and enhanced welfare of nationals in the process of economic transformation through the trade openness policy. Day by day, countries are becoming more and more integrated and opened to free trade due to globalization. Hence countries are implementing liberal economic policies and such liberal policies, especially in LDCs, are encouraging huge capital inflows from first world countries. Domestic investment, FDI, and trade openness influence economic growth but they are also affected by some other components at the disaggregated level. It is acknowledged that investment (domestic plus FDI) enhances economic growth of a country through trade openness chancel. This chapter however, explains first the variables of the domestic investment, FDI, trade openness and growth functions for Bangladesh. The arguments in favour of selecting variables for the functions are also discussed in this chapter. The conceptual analysis of the link among domestic investment, FDI, trade openness and economic growth with their various dimensions have also been explained. Finally, appropriate economic models (neoclassical, endogenous growth model and APF model) have been analyzed throughout this chapter.

## 3.1 Variables and the Key Indicators of the Study

This study examines the impact of domestic investment, FDI, and trade openness on economic growth in Bangladesh as well as assesses the interrelationship associated with them covering the period 1972 to 2013. This study further examines the impact of different factors of domestic investment, FDI and trade openness in Bangladesh with their causations associated with them at the disaggregated level. The core variables have been employed in the study include; GDP, domestic investment, FDI, trade openness, stock of labour and other related indicators. The main explanatory variables used in this study are presented in the table below with the GDP as the explained variable. This is in line with a study carried out by Adhikary (2011).

**Table 3.1.1: Variables and Their Key Indicators with Various Sources**

| Variables | Key Determinants | Description | Data Sources |
|---|---|---|---|
| Economic Growth (GDP) | Gross Domestic Product, Gross National Product, GNI, Per Capita Income, Standard of Living etc. | This is an indicator of economic growth which is measured as a growth of gross domestic product (GDP) at constant price | World Development Indicators (WDI, 2014) |
| Domestic Investment (DI) Proxied by Gross Capital Formation (GCF) | Growth Rate of Real GDP (GRGDP), Foreign Direct Investment as a Ratio of GDP (FDI), Exports of Goods and Services as a Ratio of GDP (RX), Financial Intermediation as Calculated by M2 as a Ratio of GDP (FI), Human Capital Proxied by Secondary School Enrolment Ratio (HC), and Domestic Credit Availability as a Ratio of GDP (CR). | This is measured as a percentage of Gross Fixed Capital Formation over GDP. This is adopted by Ghali & Al-Mutawa (1999), Barro (1991), Adhikary (2011). | World Development Indicators 2014, and CBN Statistical Bulletin |
| Foreign Direct Investment (FDI) | The GDP (Current US $), The Annual Percentage of GDP Growth Rate (GRGDP), The Gross Capital Formation (GCF), The Trade Openness (TO), The Labour Force Ratio to the Total Populatoin (L), The Real Exchange Rate (RER) and The Wage Rate (WR). | This is measured as a percentage of GDP | World Development Indicators (WDI, 2014) and Various National Documents. |
| Trade Openness (TO) | Real exports (RX), Real imports (RM), Domestic Real Income (GDP), Terms of Trade (TOT), Real inflation (RI), and Real Exchange Rate (RER). | This was expressed based on Gilies et al (2009) where trade openness is measured by adding import and export together and divided by GDP. i.e= $[(EX + IM)/GDP] \times 100$ | CBN Statistical Bulletin, World Development Indicators (WDI, 2014). |
| Stock of Labour Force (L) | Labour Force Ratio to the Total Populaiton, Active Population, Literacy Rate, Health Facility, Training, Technical Know how, and environment consciousness, Human Capital | Measured by the Countries Labour Force Ratio to the Total Popultion or Active Population Ages 15 to 64 Years % of Total Population. | World Development Indicators (WDI, 2014), BERs, and BESs. |

Note: The variables and their key indicators have been considered on the basis of the related literature and availability of data in Bangladesh.

## 3.2 Variables of the Study

The variables that have been considered as explanatory one based on the significant effects on the estimable function. These are explained below with natural logarithm:

### 3.2.1 Explanatory Variables for Domestic Investment Function (*lndi*)

* GDP growth rate in the log form (*lngrgdp*);

* Foreign direct investment in the log form (*lnfdi*);

* Financial intermediation calculated by $M_2$ in the log form (*lnfi*);

* Real export of the country in the log form (*lnrx*);

* Human capital proxy of secondary school enrolment in the log form (*lnhc*); and

* Domestic credit availability in the log form (*lncr*).

### 3.2.2 Explanatory Variables for FDI Function (*lnfdi*)

* Gross Domestic Product (GDP) at current US$ in the log form (*lngdp*);

* Gross capital formation in the log form (*lngcf*);

* Trade openness measured by the export, import to the GDP in the log form (*lnto*);

* Stock of labour ratio of total population in the log form (*lnl*);

* Real exchange rate in the log form (*lnrer*); and

* Wage rate in the log form (*lnwr*).

### 3.2.3 Explanatory Variables for Trade Openness Function (*lnto*)

* Real export in the log form (*lnrx*);

* Real import in the log form (*lnrm*);

* Domestic real income (GDP) at constant price in the log form (*lngdp*);

* Terms of trade in the log form (*lntot*);

* Real inflation in the log form (*lnri*); and

* Real exchange rate in the log form (*lnrer*).

### 3.2.4 Explanatory Variables for GDP Growth Function (*lngdp*)

* Stock of labour force proxy of active population ages 15-64 % of total in log form (*lnl*);

* Domestic investment proxy for gross capital formation in the log form (*lndi*);

* Foreign direct investment (FDI) in the log form (*lnfdi*); and

*Trade openness measured by the ratio of export and import to GDP in the log form (*lnto*).

## 3.3 Definition of the Key Terms

Based on the above Table the variables and the arguments in favour of considering them in the functions are briefly discussed as follows:

**3.3.1 Economic Growth:** It is defined as the increase in value of the goods and services produced by an economy. It may also be defined as the outward shift in the production possibility curve. It is conventionally measured as the percent rate of increase in real gross domestic product, or *GDP*.

**3.3.2 Gross Domestic Product (GDP):** Gross Domestic Product is used to ascertain the level of growth in the economy. It is very crucial to minimize statistical and survey error in calculating this figure. GNP (Gross national product) is another measure which is used interchangeably with GDP for economic growth calculation purpose. GNP is calculated by adding to GDP, the income earned by residents from abroad, less the corresponding income sent. For semi developed South Asian countries like Bangladesh, India and Nepal, economic growth through rise in GDP is not absolute and in many cases misleading too many. This is true due to existence of widespread poverty in these countries.

**3.3.3 Gross National Income (GNI):** The money value of produced goods and services produced by the citizen of a country within a specific period of time that is in a year is called National Income. On the other hand, the money value of the subtraction of GNP and the depreciation cost is called national income (NI).

Thus, National Income (NI) = GNP – DC / CCA

NI = GNP – CCA –$T_i$ –$T_p$ – $S_g$ + $S_b$; that is, NI = NNP – ($T_i$ + $T_p$ + $S_g$) - $S_{b;}$

Where, CCA = Capital Consumption Allounces; $T_i$ = Indirect Taxes; $T_p$ = Transfer Payment; $S_g$ = Government Surpluses; and $S_b$ = Subsidies. Thus, National Income is the money value of net national products (NNP) minus indirect taxes, transfer payments and government surpluses but subsidies will be pluses in the national income identity.

**3.3.5 Economic Development:** It is a sustainable increase in living standards that implies increased per capita income, better education and health as well as environmental protection. That is, economic development is the assimilation of the concept of freedom to choose, self esteem, free from superstition and the environmental protection of a county. The economic growth concepts successfully incorporate and assimilates core economic concept of GDP rise with social welfare. Economic development through GDP rise and improvement of infrastructure reaffirms the vision of growth contributing to the welfare of the population.

**3.3.6 Savings:** In any economy, individuals have two ways to use income; they can spend it or save it. Saving is the setting aside of income for future use and is undertaken by both individuals and institutions. If too much is spent and too little saved, the economy's capacity to produce will be diminished. If, on the other hand, too much is saved and too little spent, there will be more money available for investment that can possibly be used and not enough people will buy what is produced. Savings theories traditionally predict that current consumption is related not to current income, but to a longer-term estimate of income. Thus, the more consumption makes fewer saving and the vice-versa.

**3.3.7 Capital Formation:** All investment ultimately must be financed by saving by either domestic entities (e.g. firms, the government, households) or foreigners. A private firm, for example, finances much of its investment through contributions by equity holders, which ultimately are these individuals' personal savings. Many corporations in developing countries finance investment by borrowing from foreign banks, which in turn raise their funds primarily through saving deposits. Governments finance public investments through tax contributions, which can be thought of as a form of forced saving. The determinants of private saving are: household saving behavior, corporate saving behavior, foreign saving and the foreign aid. All of above are aggregately called capital formation.

**3.3.8 Investment:** Investment is defined as spending over a given period on new capital goods (e.g. houses, factories, machineries, etc) or on net additions to stock (raw materials, consumer goods in shops etc). In other words, Investment is any use of resources intended to increase future production of output or income. If depreciation is deducted, we get the net investment. Investment may be domestic in nature, or may originate from abroad. The latter is known as FDI (foreign direct investment). Investment, as defined by economist Paul A. Samuelson, is capital formation: "additions to the nation's stock of buildings, equipment, and inventories." Investment expenditures are commonly assumed to be totally autonomous in the introductory analysis of Keynesian economics. There are basically two types of investment: i) *induced investment* which is business investment expenditures that depend on income or production (especially national income and gross domestic product); and ii) *autonomous investment* which is business investment expenditures that do not depend on income or production (especially national income and gross domestic product).

**3.3.9 Domestic/ Local Investment:** Gross domestic investment is defined as all public and private sector expenditures for additions to the stock of fixed assets plus the net value of inventory changes. Domestic investment spending comes in two forms: i) *public investment* which comes from the government of a country. In many countries, public investment by the government is one of the most important components of both annual budgets and longer-range development strategies. The basic rationale for public investment is that individual private firms and households will not make certain critical investments, even though these would be beneficial to society as a whole. Public investment lays much of the foundation to create an environment conductive to growth. ii) *Private investment* that comes from country’s individuals or private entities as a whole. In most developing countries, the private sector is the main channel for investment. Private investment usually is grouped into three categories. First, fixed business investment includes spending on “plant” (factories, offices, warehouses, etc.) and “equipment” (machines, vehicles, and the like). Second, inventory investment measures changes in unfinished goods, stocks of input and raw materials, and finished products that are not yet sold. Third, at the household level, the major form of investment is in residential structures, including both construction and maintenance of housing stock (Perkins et al. 2003, pp. 521-534)

**3.3.10 Foreign Direct Investment:** In accordance with the United Nations Conference on Trade and Development (UNCTAD) and its World Investment Report 2006, “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).” The Bangladesh Board of Investment (2004) maintains the same definition. The International Monetary Fund defines FDI as when one individual or business owns 10% or more of a foreign company's capital. If an investor owns less than 10%, it is considered as nothing more than an addition to his/her stock portfolio. With only a 10% ownership, the investor may or may not have the controlling interest in the foreign business. However, even with just 10%, the investor usually has significant influence on the company's management, operations and policies (Duce & Espana, 2003)

**3.3.11 Financial Intermediation (FI):** A firm whose main function is to borrow money from one set of people and lend it to another is called financial intermediation. Financial intermediaries are able to operate profitably because of the economies of scale in collecting savings from many sources and making them available for large loans, and in handling information about large numbers of small debtors or the risks of lending to single large ones. Firms wishing to borrow large amounts do not want the trouble of negotiating with numerous small lenders and lenders can use financial intermediaries to get a spread of risks in their lending without the high transactions costs of making numerous single small loans to the ultimate users of their money. The use of financial intermediaries reduces risk and transactions costs for both lenders and borrowers (Black, 2003, p. 175).

**3.3.12 Human Capital / Human Resources (HC):** Improved access to education is essential in creating a workforce with the skills and knowledge needed for a healthy investment climate. Firms, whether domestic or foreign, are more eager to invest when they know that they will be able to draw on a skilled workforce to make their investment productive. Also, a healthy investment climate is not possible without a healthy labour force. Thus, the workforce with education, training, technological know how, skills and efficiencies, sound health and environment consciousness is called human capital.

**3.3.13 Domestic Credit Availability ($M_2$):** The part of any increase in the money supply which is not due to a balance of payments surplus is known as domestic credit availability. The money supply can increase through a balance of payments surplus on either current or capital account. This leads to a rise in foreign exchange reserves and a corresponding increase in base money if this is not sterilized by the monetary authorities. Alternatively, the money supply can rise through lending by the banking system to either the state or the private sector. This extra internal bank lending is domestic credit availability or domestic credit expansion (Black, 2003, p. 131).

**3.3.14 Inflation (Rate of Inflation):** Inflation is defined as an increase in the general level of prices. That is, the continuous upward rising of price level of a country is called the inflation. It is also a persistent tendency for prices and money wages to increase. Inflation is measured by the proportional changes over time in some appropriate price index, commonly a consumer price index or a GDP* deflator (Black, 2003, p. 235). Various types of inflation categorized in terms of their type and feature they carry along with them are: *Hyper inflation:* refers to extremely fast increase in price level, *Creeping inflation:* is used both for a rate of inflation that is low but even so high enough to cause problems, and for a rate of inflation that gradually moves higher over time. *Creeping inflation* refers to a steadily accelerating inflation rate, generally 1-6 % annually. *Suppressed inflation:* is a situation, where aggregate demand exceeds aggregate supply.

**3.3.15 Exports of Goods and Services:** Goods and services produced in a country and sold to non-residents is called export of the country. Visible exports are goods sent abroad; invisible exports are services sold to non-residents. Some invisibles, for example air and sea transport, are services performed abroad. In the case of other invisibles, non-residents come to a country to use the services of hotels, hospitals, universities, or casinos. Export capital means making loans to non-residents or buying real assets located abroad. This should not be confused with exporting capital goods. Some countries do both, but it is perfectly, possible, like some oil-exporting countries, to export capital without producing capital goods, and many industrial countries are capital goods exporters while borrowing abroad (Black, 2003, pp. 167).

**3.3.16 Imports of Goods and Services:** Goods and services bought by residents of a country but provided by non-residents is called import of the country. Visible imports are goods physically brought into the country. Imports of services, or invisible imports, may involve the supplier entering the country, for example to put out oil-well fires, or residents going abroad to enjoy the services of airlines, hotels, or entertainments. For some invisible items, such as payment of royalties on patents, the location of the service is not defined. Capital import means accepting foreign loans or selling real domestic assets to non-residents. This should not be confused with the import of capital goods. Many countries in fact, do both, but it are perfectly possible to import machinery without borrowing abroad, or to borrow abroad, for example to finance government spending on armaments, without importing capital goods (Black, 2003, pp. 220-221).

**3.3.17 Terms of Trade (TOT):** The ratio of an index of a country's export prices to an index of its import prices is known as terms of trade. The terms of trade are said to improve if this ratio increases, so that each unit of exports pays for more imports and to deteriorate if the ratio falls, so that each unit of exports buys fewer imports. This terminology can be misleading: if a county's terms of trade improve because of increased foreign demand for its exports, this is an improvement in its economic position. If the terms of trade improve because domestic inflation exceeds that abroad, however, the result may be problems with the balance-of trade, which cannot sensibly be regarded as an improvement in the economy. A country's factoral terms of trade may improve either because of improvements in the barter terms of trade, or because of increased productivity (Black, 2003, p. 465). The most commonly used measure of relative prices of traded goods is the commodity or net barter terms of trade, $T_i$. Where, $T_i$ is the ratio of two indexes: i) the average price of a country's exports ($P_x$), and ii) the average price of its imports ($P_m$).

$$T_i = \frac{P_x}{P_m} \times 100 \text{ ................................ } (3.2.21.1)$$

The commodity terms of trade rise if export prices rise relative to import prices and the vice-versa (Perkins et al. 2001, p. 637).

**3.3.18 Real Exchange Rate (RER):** Exchange Rate between two currencies specifies how much one currency is worth in terms of the other. The Nominal Exchange Rate (NER) is the rate at which an organization can trade the currency of one country for the currency of another. The Real Exchange Rate (RER) is an important concept in economics, through it is quite difficult to grasp concretely. It is defined by the model: RER = e (P/P*), where, 'e' is the nominal exchange rate, as the number of foreign currency units per home currency unit; where, P is the price level of the home county; and P* is the foreign price level. If a currency is free-floating, its exchange rate is allowed to vary against that of other currencies and is determined by the market forces of supply and demand. Exchange rates for such currencies are likely to change almost constantly as quoted on financial markets, mainly by banks, around the world. Like the stock exchange, money can be made or lost on the foreign exchange market by investors and speculators buying and selling at the right times (Appleyard et al. 1998, pp. 425-451).

**3.3.19 Real Interest Rate (RIR):** The real return on loans is generally called as interest rate. But, this is the money return, adjusted for inflation. If the nominal interest rate is 100i percent and the rate of inflation is 100p percent, the real rate of interest of 100r percent is given by (1+r) = (1+i)/(1+p). For low interest and inflation rates, the approximation r =i-p is fairly accurate. At times when the rate of inflation is changing, the real interest rate can be measured on forward or backward-looking basis. The backward-looking basis compares current interest rates with inflation over some recent period; the forward-looking rate compares interest rates with expected inflation over some future period. The forward-looking concept is more relevant to decision-taking, but depends on a model for estimating expectations (Black, 2003, p. 392).

**3.3.20 Balance of Payments (BoP):** The balance of payment of country measures the payments that flow between any individual country and all other countries. It is used to summarize all international economic transactions for that country during a specific time period, usually a year. The BOP is determined by the country's exports and imports of goods, services and financial capital, as well as financial transfers. It reflects all payments and liabilities to foreigners (debits) and all payments and obligations received from foreigners (credits). The balance of payments for a country is the sum of the Current account, the Capital account, the financial account, and the change in Official Reserves. *The balance of payment* is thus, the sum of the *current account* and the *capital account*. A country will have a negative balance of payments if the net of the current account and capital account is a deficit. Similarly, there will be a positive balance of payments if the net of the current account and the capital account results in a surplus.

## 3.4 Theoretical Analysis of the Issue

### 3.4.1 The Economic Growth

For nearly half a century a primary focus of world economic attention has been on ways to accelerate the growth rate of national incomes. Economists and politicians from all nations, rich and poor, capitalist, socialist and mixed, have worshipped at the shrine of economic growth. At the end of every year, statistics are compiled for all countries of the world showing their relative rates of GNP growth. "Growthmanship" has become a way of life. Governments can rise or fall if their economic growth performance ranks high or low on this global scorecard. As it is seen, development programs are often assessed by the degree to which national outputs and incomes are growing. In fact, for many years the conventional wisdom equated development almost exclusively with the rapidity of national output growth. Three factors or components of economic growth are of prime importance in any society. These are: i) Capital accumulation, including all new investments in land, physical equipment, and human resources through improvements in health, education, and job skills; ii) Growth in population and hence eventual growth in the labour force; and iii) Technological progress (Todaro & Smith, 2008, pp. 78-85).

#### 3.4.1.1 Capital Accumulation

Capital accumulation results when some proportion of present income is saved and invested in order to augment future output and income. New factories, machinery, equipment, and materials increase the physical capital stock of a nation and make it possible for expanded output levels to be achieved. These directly productive investments are supplemented by investments in what is known as social and economic infrastructure, which facilitates and integrates economic activities. All of these phenomena and many others are forms of investment that lead to capital accumulation. Simply, if there is no capital, there is no investment and no growth. The rationale to this argument is that capital accumulation helps expand productive capacity of different economic sectors by increasing number of firms. Precisely, capital accumulation helps increase investment, investment creates employment through expanding production bases, additional employment generates higher savings which provide confidence in undertaking larger investment, and this chain effect ultimately influences economic returns positively.

#### 3.4.1.2 Population and Labour Force Growth

Population growth, and the associated eventual increase in the labour force, has traditionally been considered a positive factor in stimulating economic growth. A larger labour force means more productive workers, and a large overall population increases the potential size of domestic markets. However, it is questionable whether rapidly growing supplies of workers in surplus-labour developing countries exert a positive or a negative influence on economic progress. Obviously, it will depend on the ability of the economic system to absorb and productively employ these added workers- ability largely associated with the rate and kind of capital accumulation and the availability of related factors, such as managerial and administrative skills.

#### 3.4.1.3 Technological Progress

Many economists consider the most important source of economic growth is technological progress. In its simplest form, technological progress results from new and improved ways of accomplishing traditional tasks. There are three basic classifications of technological progress: i) neutral, ii) labor-saving, and iii) capital- saving technological progress. i) *The Neutral technological progress* occurs when higher output levels are achieved with the same quantity and combinations of factor inputs such as division of labour; ii) *Labor-saving technological progress* by contrast, may either be labor-saving that is higher levels of output can be achieved with the same quantity of labour or capital inputs; and iii) *Capital saving technological progress* is a much rarer phenomenon. Technological progress may also be labour or capital-augmenting. Labour-augmenting technological progress occurs when the quality or skills of the labour force are upgraded- e.g. the use of videotapes, televisions, and other electronic communications media for classroom instruction. Similarly, capital-augmenting technological progress results in the more productive use of existing capital goods as, for example, the substitution of steel for wooden ploughs in agricultural production (Todaro & Smith, 2008).

### 3.4.2 Foreign Direct Investment (FDI) / Foreign Capital Flows

Foreign Direct Investment (FDI) or private foreign capital has taken on an increasingly important role in developing countries in recent decades. At the most basic level, private foreign capital flows are an important part of foreign saving that add to total investable funds and can help accelerate economic growth. But private capital flows play a more complex role. Depending on its form, private capital can help to open new foreign markets for export sales, bring knowledge of new products and production techniques, and encourage the transfer of new technologies. However, it also can come in forms that bring relatively few benefits and may leave developing countries vulnerable to sudden capital withdrawals and financial crisis. Private capital flows raise complex policy issues about repatriation of profits, incentives to either encourage or discourage certain types of flows, a macroeconomic management in a globalized financial system.

The international private capital flows, which takes in two main forms: 1) *Private foreign direct and portfolio investment*, consisting of (a) *foreign "direct" investment* by large multinational corporation usually with headquarters in the developed nations; and (b) *foreign "portfolio" investment* (e.g. stocks, bonds and notes) in LDC "emerging" credit and equity markets by private institutions (banks, mutual funds, corporations) and individuals; and 2) *public and private development assistance* (foreign aid), from (a) *individual national governments and multinational donor agencies* and, increasingly, (b) *private nongovernmental organizations* (NGOs), most working directly with developing nations at the local level (Todaro & Smith, 2008).

Broadly speaking, foreign private capital flows come in two forms: equity and debt. The largest type of equity flow, in fact the largest of all capital flows to developing countries, is foreign direct investment (FDI) depicted in the following table. With FDI, "equity" holders are concerned with their returns over a period of years rather than weeks or months. This characteristic makes FDI more difficult for developing countries to attract compared to other capital flows but also more important for long-term growth and development. A second type of equity flow is portfolio equity, in which an investor takes a smaller stake in an enterprise, either directly or through a stock exchange. It includes direct purchases of shares by foreign investors as well as share purchases through country funds and depository receipts (Perkins et al. 2001, pp. 521-535).

**Table 3.4.2.1: Foreign Private Capital Flows to Developing Countries** **(Billion US$)**

| Types of capital Flows | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|---|---|---|---|
| Private Debt Flows | 35.3 | 40.7 | 75.7 | 84.9 | 95.7 | 121.1 | 131.4 | 126.4 | 62.9 |
| Commercial Banks | 3.2 | 4.8 | 16.3 | 3.3 | 13.9 | 32.4 | 43.7 | 60.1 | 25.1 |
| Bonds | 1.2 | 10.8 | 11.1 | 37.0 | 36.7 | 26.6 | 53.5 | 42.6 | 30.2 |
| Others | 11.4 | 3.0 | 10.7 | 8.6 | 3.7 | 1.0 | 3.0 | 2.6 | 2.7 |
| Shor-term Debt | 19.5 | 22.1 | 37.6 | 39.0 | 41.4 | 61.1 | 31.2 | 21.1 | 4.9 |
| Portfolio Equity Flows | 3.7 | 7.6 | 14.1 | 51.0 | 35.2 | 36.1 | 49.2 | 30.2 | 14.1 |
| Foreign Direct Investment | 24.5 | 34.4 | 46.1 | 67.0 | 88.5 | 105.4 | 126.4 | 163.4 | 155.0 |
| Total Private Capital Flows | 63.5 | 82.7 | 135.9 | 205.9 | 219.4 | 262.6 | 272.9 | 320.0 | 232.0 |

Source: World Bank, Global Development Finance, 1999. (Perkins et al. 2001, p. 522)

Table 3.4.2.1 depicts that private foreign capital flows to developing and transitional economies grew very rapidly during the 1990s, from $64 billion in 1990 to $ 320 billion in 1997. Private flows to developing countries were comparable in size to official flows in 1990 but were fully eight times larger in 1997. Private foreign capital flows typically are the equivalent of no more than 4-5 percent of the GDP in developing countries and therefore, account for perhaps one fourth or less of available investable funds. From the perspective of the most basic economic growth models (such as the Harrod-Domar and Solow models), which emphasize the role of capital formation in the growth process; private foreign capital flows are only modestly important.

### 3.4.3 Foreign Direct Investment and the Multinationals

A multinational is an enterprise that produces in more than one country and considers overseas operations to be central to its profitability. Multinational enterprises come in all sizes and from all regions of the world, including the developing countries, but most multinationals are based in the industrial countries. Not surprisingly, the vast majority of FDI comes from rich country investors. In the 1960s and 1970s, many developing countries were suspicious of FDI and often took steps to actively discourage it. At the time, because of the recent colonial history in many countries, the sometimes outrageous behavior of certain foreign investors in taking advantage of weak political and legal systems to make huge profits, and the tendency for many foreign investors to gain monopoly rights in some countries, this suspicion often was well funded. The sharp increase in FDI is due partly to worldwide advances in technology in communications and transportation, and it goes hand in hand with the rapid expansion in world trade during the period. Direct investment still generates much controversy, however. Its influence is magnified because foreign investment usually comes in a package that may include not only equity finance, but often much larger amounts of loan finance, management expertise, modern technologies, technical skills, and access to world markets. Investment by a multinational corporation raises the specter of interference by, and dependence on, foreign economic powers beyond the control of the host country. According to the World Bank, in 1991, developing countries received less than one fourth of global FDI flows; by 1998, the share had reached 42 percent. In 1997, a 70 percent of all FDI inflow in developing countries was directed at just ten countries of the world (Perkins et al. 2001, pp. 521-535).

### 3.4.4 Benefits and Costs of Foreign Direct Investment

Transfer of capital from rich to poor countries, foreign direct investment is relatively small but of growing importance. Kimberly, 2014 and Perkins et al. 2003, state the benefits of FDI in developing countries for both the investors and the recipient are: one, is that it allows money to freely go to whatever business has the best prospects for growth anywhere in the world. That's because investors aggressively seek the best return for their money with the least risk. This motive is color-blind, doesn't care about religion or form of government. The cost of FDI on the other hand, includes concern of ownership, profit margin, environment pollution and sovereignty of the state etc. Besides, Recep Kok et al. 2006, observes that FDI flows to developing countries have had also some negative side effects (costs), those are: i) worsening of environmental pollution; ii) exacerbating inter-regional economic disparities as a result of the uneven distribution of FDI; iii) transfer pricing and iv) encouraging round tripping of the capital of domestic firms. Recent literature has also raised concerns about the harmful effects of flows of capital on the recipient countries.

### 3.5.1 Free Trade and Economic Growth

International free trade has been called the “engine of growth” that propelled the development of today’s economically advanced nations during the nineteenth and early twentieth century’s. Rapidly expanding export markets provided an additional stimulus to growing local demands that led to the establishment of large scale manufacturing industries. Together with a relatively stable political structure and flexible social institutions, these increased export earnings enabled the developing country of the nineteenth century to borrow funds in the international capital market at very low rates of interest. This capital accumulation in turn stimulated further production, made possible increased imports, and led to a more diversified industrial structure. In the nineteenth century, European and North American countries were able to participate in this dynamic growth of international exchange largely on the basis of relatively free trade, free capital movements, and the unfettered international migration of unskilled surplus labour.

Today, the situation for many LDCs is very different. With the exception of a few very successful East Asian countries, the non-oil-exporting (and, indeed, some oil exporting) developing countries face formidable difficulties in trying to generate rapid economic growth on the basis of world trade. Ever since the First World War, many developing countries have experienced a deteriorating trade position. Their exports have expanded, but usually not as fast as the exports of developed nations. Their terms of trade have declined steadily. Export volume has therefore, had to grow faster just to earn the same amount of foreign currencies as in previous years. Finally where developing countries are successful at becoming lower-cost producers of competitive products with the developed countries (e.g. textiles, clothing, shoes, some light manufactures), the latter have typically resorted to various forms of tariff and non-tariff barriers to trade, including import quotas, sanitary requirements, and special licensing arrangements.

### 3.5.2 Trade Openness

The trade-to-GDP ratio is frequently used to measure the importance of international transactions relative to domestic transactions. This indicator is calculated for each country as the simple average (*i.e.* the mean) of total trade (*i.e.* the sum of exports and imports of goods and services) relative to GDP. This ratio is often called the trade openness ratio, although the term "openness" may be somewhat misleading, since a low ratio does not necessarily imply high (tariff or non-tariff) barriers to foreign trade, but may be due to factors such as size of the economy and geographic remoteness from potential trading partners. Again openness in trade refers to the degrees to which countries or economies permit or have trade with other countries or economies. Open economies generally greater market opportunities, at the same time they also face greater competition from businesses based in other countries. In terms of financial development trade openness enables a firm to obtain funds from other countries, and also invest its surplus funds in other countries. Birdsall and Hamoudi (2012) state that levels and changes in the value of exports and imports divided by aggregate GDP (the trade/GDP ratio) are occasionally used as measures of trade “openness.” The interpretation of the openness index is the higher the index the larger the influence of trade on domestic activities. Trade openness of a country can be calculated as:

$$\boldsymbol{TO = [\frac{export + import}{GDP}] \times 100}$$

### 3.5.3 Gains from Trade

Standard trade theory of international trade often referred to as the neoclassical model of international trade. It has been challenged (primarily because of the assumption of perfect competition) by models that incorporate imperfect competition, increasing returns, and learning effects. Seminal contributions in this branch of the literature (Linder, 1961; Posner, 1961; Vernon, 1966; Krugman, 1979; Caves, 1985, Helpman and Krugman, 1985; and Rodrik, 1988) posit three channels through which trade liberalization affects economic growth (Farzana, 2014). First, there are *gains from exchange*. Consumers benefit directly from lower prices of imports when trade barriers are reduced. Second, *gains from specialization*: reducing trade barriers encourages firms to direct resources away from previously protected sectors and towards those that have the greatest value added (in both domestic and international markets). Third, there are *gains from economies of scale*. Lowering trade barriers has a pro-competitive effect on firms. In short run, trade restrictions create price distortions that shift production between countries. The removal of these price distortions through the lowering of trade barriers leads to a more efficient allocation of resources, as making domestic markets more open to competition from foreign sources encourages production based on comparative advantage. In the longer run there are numerous potential sources of dynamic gains. Reduced trade barriers allow domestic industries greater access to intermediate goods, capital goods, and technologies that foster economic growth. For many developing countries with savings rates insufficient to develop the capital markets which support economic growth, foreign direct investment (FDI) is necessary for the economy to grow. Theory however, tells us greater openness to trade stimulates economic growth and that casual observation suggests that countries which pursue more liberal trade policies are more successful economically.

## 3.6 Theoretical Issue and the Conceptual Framework

Within the framework of the neo-classical models that follow Solow model (1956), the impact of investment on the growth rate of output was constrained by diminishing returns to physical capital. The policy makers believe that domestic private investment has a stronger and more favourable effect on growth rather than public investment. Probably private investment is more efficient and less closely associated with corruption (Bakare, 2011). International community such as International Monetary Fund and the World Bank hailed and supported the structural reform as a good example of adjustment with growth. So, the significance of domestic investment in a country can be interpreted as: First, it increases the economic growth (sustain increase in real per capita national product). This brings national income effect, balance of payment effect & public revenue effect. Second, it accelerates the industrial innovation this develops in integrations take a variety form which is not necessarily mutually exclusive. Third, it sustains to increase the degree to which political functions are effectively and collectively oriented, universalistic specific and achievement oriented. Finally, it also brings infrastructural development & modern nationalism.

On the other hand, in the context of the new and endogenous theory of economic growth, however, FDI can affect not only the level of output per capita but also its rate of growth. Literature has posed various hypotheses that explain why FDI may potentially enhance the growth rate of per capita income in the host country. First, FDI can be considered as one of the main transmission vehicles of advanced technology from leaders to developing countries (Borensztein et al., 1998). Generally speaking, LDCs lack the necessary background-in terms of educated population, infrastructure, liberalized markets, economic and social stability and so forth-in order to be able to innovate and generate new discoveries and designs. Accordingly, they will have to benefit from the diffusion of technology that originates elsewhere. The technological diffusion from the leader countries to LDCs can take place through FDI. Technological advances implemented by multinationals may spill over to the rest of the economy, giving rise to beneficial externalities and encouraging domestic private activity. It may facilitate the extraction and distribution of raw materials produced in the host country by improving the network of transport and communication. FDI can also beneficially affect the productive efficiency of domestic enterprises. Local firms have an opportunity to improve their efficiency by learning and interacting with foreign firms. It can also raise the quality of domestic human capital and improve the know-how and managerial skills of local firms (the learning by watching effect). Furthermore, FDI does not lead to the problems associated with alternative ways of raising funds in international markets and the need to cover current account deficits.

Theoretically, the linkage among domestic investment, foreign direct investment (FDI), trade openness, and economic growth tends to be positive. A number of reasons can be outlined in favor of this assertion as: i) the neoclassical and endogenous growth theories underline that FDI promotes economic growth in a capital scarce economy by increasing volume as well as efficiency of physical investment (Romer, 1986; Lucas, 1988; Grosman

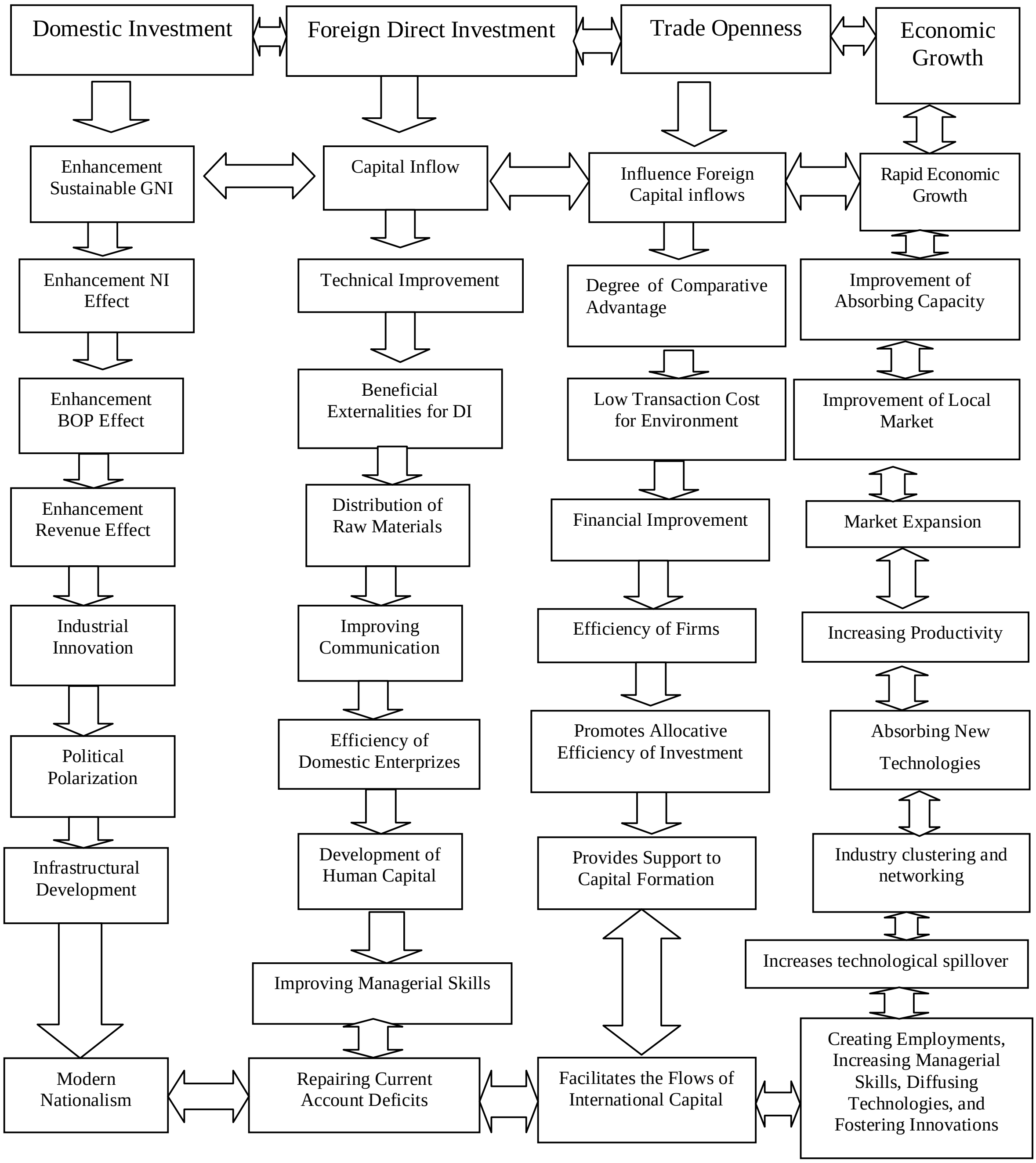
& Helpman, 1991; Baro & Salai-I-Martin, 1995). In other words, FDI supplies long-term capital with new technologies, managerial know-how and marketing capabilities which, in turn, augment economic growth by creating employments, increasing managerial skills, diffusing technologies and fostering innovations (Asiedu, 2002); ii) FDI can facilitate 'agglomeration economies' through industry clustering and networking, and lowering costs for all producers in the market (Krugman, 1991); and iii) FDI increases technological spillover benefits, widens the scope of international competition and strengthens the supply side capabilities of a host country for producing and selling goods and services, which lead to higher economic growth (Pugel, 2007).

Second, the degree of trade openness is likely to influence the flows of international capital in terms of risk-return relationship. The level of trade openness also indicates the degree of comparative advantage of a country in undertaking investment. Moreover, the endogenous growth theories stress that a more open trade policy framework promotes allocative efficiency of investment by reorienting factors of production to sectors that have comparative advantages in trade; thereby augmenting economic growth (Solow, 1956; Balasubramanyam et al., 1996). A country with a higher degree of economic openness can grow faster by absorbing new technologies at a faster rate than a country with a lower degree of openness (Edwards, 1992).

Third, the level of capital formation for domestic investment is likely to influence FDI and economic growth as well. Neo-classical growth model postulates that developing economies that have a lower initial level of capital stock tend to have higher marginal rate of returns (productivity) and growth rates if adequate capital stock is injected. The new endogenous growth theories further postulate that the increased efficiency of investment brought by FDI provides a comparative advantage to the capital scarce economies to catch-up or to converge with the richer economies in the long-run (Romer, 1986).

Finally, FDI channels much needed capital for investment and provides support to capital formation; trade openness facilitates the flows of international capital and redirects factor endowments to more productive sectors; a high level of capital formation ensures needed finance for the industries growth and development; and all of them jointly promote economic growth at large. From this perspective, the linkage between domestic investment, FDI, trade openness and economic growth ought to be positive. Besides, this nexus should be cointegrated in the long run.

**Flow Chart 3.6.1: Linkages among Investment, Trade Openness and Growth**




However, the opposite arguments of FDI, domestic investment and trade openness are also not uncommon. Firstly, it may reduce the domestic savings and thus less domestic investment which may result in reduction in growth (Razzaque & Ahmed, 2000). Secondly, it may crowd out domestic investment which may result into reduction in the economic growth. Some economists also argue that multinationals are harmful for the host countries. These economists have created a hostile environment to FDI, especially in the Developing areas. But, in a market-oriented approach, domestic investment and FDI (instead of the state) play the main role in the development process. Thus, Economic growth may simply reflect the fact that FDI is attracted to countries that are expected to grow faster and follow open-trade policies. The whole gamut of the issue can be illustrated by the above Flow Chart 3.6.1.

## 3.7 Models Specification of the Study

Most of the economic growth models focus primarily on the basic factors of production: the capital stock and the labour force. Natural resource endowments, including land, sometimes are incorporated as a third factor of production but most often are subsumed as part of the capital stock. 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. These economy-wide relationships are called Aggregate Production Functions.

### 3.7.1 The Solow Growth Model (The Neoclassical Production Function Model)

In the mid-1950s, MIT economist Robert Solow introduced a new model of economic growth that represented an important step forward from the Harrod-Domar framework. Solow recognized the problems that arose from the rigid production function in the Harrod-Domar model, which did not allow for substitution between the factors of production. Solow's answer was to drop the fixed-coefficients production function and replace it with a neoclassical production function that allows for more flexibility and substitution. In effect, in the Solow model, the capital-output and capital-labour ratios no longer are fixed but vary depending on the relative endowments of capital and labour in the economy and the production process.

The Solow model is understood most easily by expressing all the key variables in per-worker terms. To do so, we divide both sides of the production function $Y = F(K, L)$ by L, so that it takes the form

$$\frac{Y}{L} = F(\frac{K}{L}, 1) \text{-----------------------------------------} \quad (3.7.1.1)$$

The equation shows that output per worker is a function of capital per worker. If we use notation in which small case letters represent quantities in per-worker terms, then y is output per worker (that is, $y = (\frac{Y}{L})$ and k is capital per-worker ($k = \frac{k}{L}$). This gives us the first equation of the Solow model, in which the production function can be written simply as

$$y = f(k) \text{ ---------------------------------------------- } (3.7.1.2)$$

Solow's model assumes a production function with the familiar property of diminishing returns to capital. The first equation of the Solow model tells us that capital per worker is fundamental to the growth process. In turn, the second key equation of the model focuses on the determinants of change in capital per worker. This second equation shows that capital accumulation depends on saving, the growth rate of the labour force and depreciation:

$$\Delta k = sy - (n+d)k \text{ ---------------------------------- } (3.7.1.3)$$

This is very important equation, it states that the change in capital per worker ($\Delta k$) is determined by three things. i) $\Delta k$ is positively related to saving (or investment) per worker; ii) $\Delta k$ is negatively related to population growth, shown by the term $-nk$; and iii) Depreciation erodes the capital stock, the amount of capital per worker will fall by the amount $-dk$ simply because of depreciation. Therefore, saving (and investment) adds to capital per worker, while labour force growth and depreciation reduce capital per worker. When saving per capita, $sy$, is larger than the amount of new capital needed to compensate for labour force growth and depreciation $\{(n+d)\ k\}$, then $\Delta k$ is a positive number. This implies that capital per worker ($k$) is increasing (Perkins et al., 2001, pp. 52-61).

According to traditional neoclassical growth theory, output growth results from one or more of three factors: increases in labour quantity and quality (through population growth and education), increases in capital (through saving and investment), and improvements in technology. Closed economies (those with no external activities) with lower savings rates (other things being equal) grow more slowly in the short run than those with high savings' rates and tend to converge to lower per capita income levels. Open economies (those with trade, foreign investment, etc.), however, experience income convergence at higher levels as capital flows from rich countries to poor countries where capital-labour ratios are lower and thus returns on investments are higher (Perkins et al., 2001, pp. 51-61).

### 3.7.2 The Romer Endogenous Growth Model

Models of endogenous growth bear some structural resemblance to their neoclassical counterparts, but they differ considerably in their underlying assumptions. The most significant theoretical differences stem from discarding the neoclassical assumption of diminishing marginal returns to capital investments, permitting increasing returns to scale in aggregate production, and frequently focusing on the role of externalities in determining the rate of return on capital investments. Romer endogenous model addresses technological spillovers that may be present in the process of industrialization. Thus, it is not only the seminal model of endogenous growth but one of particular relevance for developing countries. In this case, we use a simplified version of Romer's model that keeps his main innovation- in modeling technology spillovers-without presenting unnecessary details of savings determination and other general equilibrium issues.

In this simplification, we abstract from the household sector, an important feature of the original model, in order to concentrate on issues concerning industrialization. Formally,

$$Y_t = AK^{\alpha}{}_t L_t^{1-\alpha} \overline{K}^{\beta} \text{ --------------------------------- } (3.7.2.1)$$

We assume symmetry across industries for simplicity, so each industry will use the same level of capital and labour. Then, we have the aggregate production function:

$$Y = AK^{\alpha+\beta} L^{1-\alpha} \text{ ------------------------------------- } (3.7.2.2)$$

To make endogenous growth stand out clearly, we assume that A is constant rather than rising over time; that is, we assume for now that there is no technological progress. With a little calculus, it may be shown that the resulting growth rate for per capita income in the economy would be:

$$g - n = \beta / (1 - \alpha + \beta) \text{ ------------------------------ } (3.7.2.3)$$

Where, g is the output growth rate and n is the population growth rate. Without spillovers, as in the Solow model with constant returns to scale, $\beta = 0$, and so per capita growth would be be zero (without technological progress). Romer assumes, however, that taking three factors together, including the capital externality, $\beta>0$; thus $g-n>0$, and $Y/L$ is growing. Now we have endogenous growth, depending on the level of savings and investment undertaken in the model, not driven exogenously by increases in productivity. If we also allowed for technological progress, so that $\lambda$ in the Solow model is greater than zero, growth would be increased to that extent. The interesting property of the Romer model is that with an investment (or technology) spillover, the model avoids diminishing returns to capital. In one way or another, endogenous growth models introduce assumptions that ward off such diminishing returns that go on the characteristics of developing countries like Bangladesh.

### 3.7.3 The Aggregate Production Function (APF) Model

The aggregate production function (APF) which includes FDI and other relevant variables in the modeling is used and the standard APF is widely used in literature (Feder, 1983; Fosu, 1990; Herzer, Nawak-Lehman and Sliverstoves, 2006; 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, openness which can be influential to growth. Following Fosu and Magnus (2006), the APF model to be used in this study is as Cobb-Douglas production function as:

$$Y_t = A_t L_t^{\alpha} K_t^{\beta} \quad \text{……………………..……………………………….. (3.7.3.1)}$$

Where $Y_t$ is the production of the economy which is GDP per capita at time t; $A_t$, $K_t$, $L_t$ are the total factor productivity, the stock of capital, the stock of labor. The impact of FDI and other relevant variables can be captured through $A_t$ component of the APF. Moreover, in many cases it is argued that FDI's influence can be seen correctly, if another component, which goes along with this such as openness, can be included in the model. As we want to know the impact of the FDI on GDP, after including all the relevant variables, the model will be

$$Y_t = A_t(FDI_t, TO_t) L_t^{\alpha} K_t^{\beta} E_t \quad \text{……………................................... (3.7.3.2)}$$

Here $E_t$ is exogenous component of growth. The equation of the above function will be:

$$Y_t = E_t FDI_t^{\delta} TO_t^{\phi} L_t^{\alpha} K_t^{\beta} \quad \text{…………………………………….. (3.7.3.3)}$$

Here α, β, δ, and φ are constant elasticity coefficients of output with respect to K, L, FDI and TO-trade as percent of GDP. From the equation (3.7.3.3) the taking log in both sides the equation will now become:

$$\ln Y_t = c + \alpha \ln L_t + \beta \ln DI_t + \delta \ln FDI_t + \phi \ln TO_t + \varepsilon_t \quad \text{….. ……… (3.7.3.4)}$$

Where, all variables are as defined and c is constant term and $\varepsilon_t$ is white noise error term; α, β, δ, and φ are expected to be positive. From the equation (3.7.3.4), Y is defined as real domestic product per capita, DI is the domestic investment has been used as the proxy of gross capital formation; L is the stock of labor force proxy of active population ages 15-

64 % of total, TO is the trade openness which is the sum of export and import values of the GDP.

### 3.8 Conclusion

This chapter incorporates variables first as the empirical requirements of study whereas the definitions of variables with their key indicators are analyzed. In the second phase of this chapter, the theoretical and conceptual discussion of the issue are described. In the third phase, the economic models of the relevant issue are stated. The neoclassical and endogenous growth models can be considered as a theoretical foundation for FDI led economic growth hypothesis of a country. The neoclassical economists also view FDI as more reliable and less volatile sources of capital for the developing economies that can augment economic growth (Blomstorm et al., 1994; Borenzstein et al., 1995; Balasubramanyam et al., 1996; Lipsey, 1999; Moosa, 2002; Moosa & Cardak, 2006). On the other hand, endogenous growth model focuses on incorporating organizational, managerial, technical and human skills, innovation and technological progress, and accumulation of knowledge endogenously in the growth theories that are often brought by FDI (Romer, 1986; Lucas, 1988; Mankiw et al., 1992; and Pugel, 2007). Although empirical literature does not have consensus in tracing the link between trade openness and the economic growth, a more conclusive view is found with respect to the capital accumulation and economic growth. Both the classical and neo-classical growth model postulates that capital is nucleus to economic growth. The rationale to this argument is that capital accumulation helps expand productive capacity of different economic sectors by increasing number of firms in the developing countries.

# Chapter Four: Present States of the Issues in Bangladesh

## Section 1: An Overview of Domestic Investment

### 4.1.1 Introduction

It is known to all that high rates of saving and investment are essentially prerequisites for high economic growth, but domestic saving in Bangladesh, on which investment greatly depends, has remained stagnant at around 20% of GDP in the most recent years. There remains a clear gap between savings and investment in Bangladesh. The result is the low level of domestic investment here. One of the objectives of this study is to state the current trend and pattern of domestic investment, FDI and trade openness in Bangladesh. Therefore, this chapter tries to provide a brief overview discussion of the present states of domestic investment first, then FDI and trade openness in Bangladesh successively. The trend and pattern of investment, the saving-investment scenarios, capital formation and consumption pattern of the people have also been discussed deliberately through this chapter. This chapter also tries to find out the investment policy, the factors that affect the investment climate in Bangladesh private and publicly.

### 4.1.2 Saving and Investment Scenarios in Bangladesh

Individual income has two forms: the consumption and the savings. Savings then turn into investment for further production in an economy. Savings have also two forms: the public and private savings. Public saving has always been negative in the country as the growing fiscal deficits in successive annual budgets. Domestic saving in the country, therefore, comes essentially from the private sector. Private saving is however, low partly because of weak intermediation in the banking sector but largely due to low per capita incomes (Bhuyan, 2011).

**Table 4.1.2.1: Saving and Investment Trend (as percentage of GDP) (Base Year 2005-06)**

| Fiscal Year | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|---|
| Gross Domestic Saving | 20.01 | 20.25 | 20.35 | 20.31 | 20.01 | 21.56 | 22.14 | 22.50 | 21.75 | 21.39 |
| Public | 1.40 | 1.41 | 1.41 | 1.35 | 1.32 | 1.35 | 1.38 | 1.36 | - | - |
| Private | 18.61 | 18.84 | 18.94 | 18.96 | 18.77 | 18.75 | 17.91 | 18.01 | - | - |
| Gross National Saving | 25.84 | 27.67 | 28.66 | 30.21 | 32.37 | 29.49 | 28.95 | 29.86 | 30.53 | 30.54 |
| Gross Investment | 24.53 | 24.65 | 24.46 | 24.21 | 24.18 | 26.23 | 27.39 | 28.26 | 28.39 | 28.69 |
| Public | 6.21 | 6.00 | 5.45 | 4.95 | 4.63 | 4.67 | 5.25 | 5.76 | 6.64 | 7.30 |
| Private | 18.32 | 18.65 | 19.02 | 19.25 | 19.55 | 21.56 | 22.14 | 22.50 | 21.75 | 21.39 |
| Investment-Saving Gap | - 4.52 | - 4.40 | - 4.11 | - 3.90 | - 4.17 | - 4.67 | - 5.25 | - 5.76 | - 6.64 | - 7.3 |

Source: Bangladesh Economic Review, 2014. Finance Division, Ministry of Finance

Table 4.1.2.1 states that the national saving rate has of course depicted a rising trend since FY 2004-05, due mainly to a robust remittance growth, but remittance inflows generally go to add to the country's foreign exchange reserves. The gross domestic saving is become 21.39 % in 2013-14, whereas it was 20.25% of GDP in 2005-06. The increasing rate is very slow and unremarkable. The gross national savings rate stands to 30.54% of GDP in 2013-14, while it was 27.67% in 2005-06 in Bangladesh. The amount of gross domestic investment rises to 28.69 % of GDP in 2013-14, while it was 24.65 % in the year 2005-06. There is a positive sign in this case but a very remarkable negative gap between saving-investment is shown in Bangladesh and the gap is going to increase with the span of time. The gap is also clearly observed between the public-private saving-investments in Bangladesh with rising trend over the period. Because of low domestic saving rates, gross capital formation has slowed down consistently in the recent years, hovering at around 24% of GDP. The main reason behind the slowing down of investment has been a secular decline in public investment which, as proportion of GDP, fell to a historic low of 4.6% in FY2008-09 from 6.2% in FY2004-05. As public investment has not increased, the private investment does not play the significant role in Bangladesh.

The large-scale investment in infrastructure sector including power and the speedier implementation of Annual Development Programme (ADP) pushes up the level of public investment in FY 2011-12. During this period, gross investment accelerates to 25.45 percent of GDP from 25.15 percent in the previous fiscal year. Of this, gross private investment marginally goes down to 19.14 percent of GDP, from 19.51 percent of GDP in FY2010-11. However, public investment in Bangladesh is increased to 7.30 percent of GDP in 2013-14 from 5.64 percent in FY2010-11. Again, the targeted GDP growth in the present and in the coming years will require a considerable increase in the investment-perhaps worth almost an additional 2% of GDP every year. Preliminary estimates made by the Finance Division prior to the formulation of 2008-09's budget showed an investment shortfall of $1.04 billion in FY2009-10. The shortfall rises to $9.40 billion in 2013-14, when the cumulative shortfall stands at $ 28 billion depicted in the following Table:

Table 4.1.2.2 indicates that the huge investment need would require resource mobilization by increased public savings through higher revenue earnings, and increased private savings- by both individuals and the corporate sector. The targeted GDP growth rate was 8.0 % in 20013-14, but the achieved growth rate is 6.5 % in the same year. There is also a clear gap between targeted and achieved investment in Bangladesh. In 2013-14, the required investment was 49.69 billion US $ but the actual investment is 30.40 billion US $ in the same year.

**Table 4.1.2.2: Investments Needed to Achieve the Targeted GDP Growth Rate (%)**

| Item / Fiscal Year | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | Total |
|---|---|---|---|---|---|---|
| Targeted GDP Growth (%) | 6.0 | 6.8 | 7.5 | 8.0 | 8.0 | 36.3 |
| Achieved GDP Growth (%) | 6.1 | 6.7 | 6.2 | 6.03 | 6.5 | 31.53 |
| Required Investment (US$ billion) | 24.59 | 30.63 | 37.18 | 43.82 | 49.69 | 185.91 |
| Investment as percent of GDP | 24.0 | 27.02 | 29.25 | 30.40 | 30.40 | 141.25 |
| MTMF-estimate of Available Investment (US$ billion) | 23.55 | 27.10 | 31.36 | 35.54 | 40.29 | 157.84 |
| Investment Shortfall (US$ billion) | 1.04 | 3.53 | 5.82 | 8.27 | 9.40 | 28.06 |

Source: Finance Division, Ministry of Finance, Bangladesh Economic Review, 2014.

Table further indicates that there is clear investment shortfall in Bangladesh and this shortfall is increasing day by day. However, since available domestic saving will be insufficient to meet the needs of increased investment, the country will need larger doses of foreign direct investment (FDI) to meet the resource shortfall.

**Table 4.1.2.3: Proposed Local and Foreign Private Investment in Bangladesh**

| Year | Proposed Local Investment | | Proposed Foreign Investment | | Total Proposed Investment | | Growth % |
|---|---|---|---|---|---|---|---|
| | Project | US$ m | Project | US$ m | Project | US$ m | |
| 2006 | 1754 | 2,662 | 135 | 3,621 | 1889 | 6,283 | 125% |
| 2007 | 1930 | 2,849 | 191 | 1,728 | 2121 | 4,577 | -27% |
| 2008 | 1615 | 2,834 | 143 | 787 | 1758 | 3,621 | -21% |
| 2009 | 1336 | 2,481 | 132 | 2,138 | 1468 | 4,618 | 27% |
| 2010 | 1600 | 6298 | 185 | 3174 | 1785 | 9472 | 105% |

Source: Provisional data from BOI, 2011.

Table 4.1.2.3 explains that in Bangladesh the registration of new investment with the Board of Investment rose significantly since 2009. In 2010, 1785 companies were registered with BOI, with a combined proposal for $9472 million (local $6298 million and foreign $3174 million) - a 105 percent increase over the previous year. The proposed foreign investment in the country was 48% higher, and the proposed local investment was 158% higher than in 2009 (Table 51.2.3). The number of projects (1785) remains almost the same in compare with the year 2006 (1754), but investment amount increases over the year and the figure stands to 9472 million US $ in 2010 from 2,662 million US $ in Bangladesh.

### 4.1.3 Foreign Exchange Reserve in Bangladesh

Foreign exchange reserve is one of the main factors of countries' capital formation for local investment. Therefore, it is the requirement to understand current foreign exchange reserve of Bangladesh. The country's foreign exchange reserve marked 24 percent increase in the outgoing year 2014 when the remittance inflow rose by nearly 10 percent, according to the Bangladesh Bank (BB, 2014). The latest BB data showed that the foreign exchange reserve stood at $22.34 billion on December 23, which was nearly 24 per cent higher than $18.04 billion on December 23, 2013 (The Independent, 23 Dec. 2014). The reserve, however, reaches at all-time of $22.38 billion on December 18, 2014. This figure reaches to the historic stage at 23.00 billion US $ on 27 February 2015 (27 February 2015). The record reserve is supported by the steady remittance inflow and export growth, reports BSS. The record amount of reserve and steady remittance inflow in 2014 boosts the country's GDP outlook, supports the current account balance and helps offsetting the high-reliance on the garment exports, according to some study reports.

### 4.1.4 Investment Policy in Bangladesh

The Government of Bangladesh has put in place a comprehensive array of policies aimed at bringing about significant socio-economic improvement to the people of Bangladesh and ultimately, self-reliance, for the nation. In recognition of the private sectors' ability to contribute towards achievement of these goals, the government has recently implemented a number of significant policy reforms. In order to achieve the objective of accelerating industrial growth and to gain a greater share of industry in the Gross Domestic Product (GDP) as well as to make the industrial policy responsive to the changes occurring in the global economy, the government announced a new Industrial Policy-1999.The main features of the Industrial Policy 1999 are:

i) to expand the production base of the economy by accelerating the level of industrial investment;
ii) to promote the private sector to lead the growth of industrial production and investment;
iii) to focus the role of the government as a facilitator in creation an enabling environment for expanding private investment;
iv) to permit public undertaking only in those industrial activities where public sector involvement is essential to facilitate the growth of the private sector;
v) to ensure rapid growth of industrial employment by encouraging investment in labor intensive manufacturing industries;
vi) to generate female employment in higher skill categories through special emphasis on skill development;
vii) to raise industrial productivity and to move progressively to higher value added products through skill and technology up gradation;

viii) to enhance operational efficiency in all remaining public manufacturing enterprises through appropriate management restructuring and pursuit of market oriented policies;
ix) to diversify and rapidly increase export of manufactures;
x) to encourage the competitive strength of import substituting industries for catering to a growing domestic market;
xi) to ensure a process of industrialization which are environmentally sound and consistent with the resource endowment of the economy;
xii) to encourage balanced industrial development throughout the country by introducing suitable measures and incentives;
xiii) to effectively utilize existing production capacities;
xiv) to develop indigenous technology and to expand production based on domestic raw materials; and
xv) to rehabilitate deserving sick industries.

Industrial policy (1999) clearly specifies that the role of the private sector has been recognized as a predominant one. Except reserved sectors, private sector investment has been kept open without any ceiling. Private investment both local and foreign or joint venture between local and foreign or with public sector is allowed.

#### 4.1.4.1 Board of Investment (BOI)

The government of Bangladesh established the Board of Investment (BOI) in 1989 for accelerating private investments in Bangladesh. The Board, headed by the Prime Minister of the Republic is vested with necessary powers to take decisions for speedy implementation of new industrial projects and provide operational support services to the existing ones. The major functions of Board of Investment (BOI) include the following:

i) undertaking investment promotion activities at home and abroad;
ii) providing all types of facilities for promotion of capital investment and rapid industrialization;
iii) registration of industrial projects as well as royalty, technical know-how and technical assistance agreements wherever required;
iv) approval of payment of royalty, technical know-how and technical assistance fees to foreign nationals/ organisations beyond the prescribed limits;
v) issuing work permit to expatriate personnel working in private sector industrial enterprises;
vi) providing import facilities to industrial units in the private sector;
vii) approval of the terms and conditions of foreign private loan and suppliers’ credit;
viii) allotment of land in the industrial areas/estates for industrial purpose;

ix) conciliation of disputes relating to foreign investors; and

x) providing assistance to avail infrastructure facilities for industries.

All these incentives are taken for the govt. of Bangladesh for attracting local entrepreneurs to invest more in the industrial sectors but still now private investment in Bangladesh is lagged behind due to the shortage of capital, technological know how, political instability, corruption and some other impediments in this regard.

### 4.1.5 Importance of Domestic Investment in Bangladesh

Bangladesh should prop up its own domestic investment and nurture its rural industrial base, if it is to leverage further economic potential and industrial growth. The key factor behind a country's economic success is the upsurge in its local business entrepreneurship; and the priority should be given to the domestic investors to lead the industrial upsurge. A significant portion of this domestic investment should come not only from the urban areas but also from the rural areas. In case of China at the first fifteen years of the Chinese growth back in the 1980s and 1990s, most of the industries there did not develop in the urban areas but in the countryside and it is the Chinese rural people who have generated that investment. Although most of the people in Bangladesh live in the rural areas, there is a lack of job opportunities there. The new employment opportunities have to come not only from urban ventures, but also from the rural ones. It does not think that access to capital is going to be a big issue for the prospective countryside investors (Sundaram et al., 2010; Bhuiyan, 2014). Mr. Sundaram’s quotation in this regard is:

> "Many would say that in Bangladesh, the savings rate is not high, but I should say that actually the investment rate is not high and if you have a high investment rate, savings rate would eventually follow and Bangladesh should not have problem with access to capital because savings rate is higher than the investment rate and people are sending money from abroad but the problem is the savings are not becoming investment, instead people are chasing after short-term benefits.”

For drawing instances of successful domestic investment in Bangladesh, Sundaram cited the example of the pharmaceutical sector, which was developed by local ventures. Now, to take these industries even further, there is a need for advanced and appropriate training for the young pharmacists in the sector while significant emphasis should also be put on research and development. The most notable change in the last 15 years is that the business entrepreneurs in Bangladesh are now more confident. Bangladesh has to see its competitive advantage in more creative terms than just to think in terms of cheap labour and garments. Bangladesh has a huge pool of highly educated and skilled human resources and now the question is how to leverage that. It is now more important to leverage education than cheap labour so that it could emphasis first on domestic investment.

### 4.1.6 Factors Affecting Domestic Investment in Bangladesh

Domestic investment in Bangladesh is stimulated by real GDP growth as well as expansion of exports of goods and services. In addition, the development level of financial sector and human capital is crucial for stimulating domestic investment in long run while the increase in domestic credit availability will enhance domestic investment in the short run. Hence, it is arguably worthy for the authorities to encourage both export expansion and FDI inflows to stimulate domestic investment and thereafter economic growth (Al-Khatib et al., 2000). As a developing country, the following factors are responsible for the poor investment in Bangladesh.

**i) Interest Rate:** Interest of a country is one of the major factors for domestic investment. The low interest rate is the high investment in the country. This study uses the real interest rate, defined as the prime rate minus the average of the past two years CPI inflation which depends on the overall size of the economy. In Bangladesh the real interest rate is very high and variant in the different banks and financing institutions resulting is the low investment in the country.

**ii) The Stock Market:** Capitals for local investment are accumulated through stock market. It is also another important factor of investment. The stock market in Bangladesh is very much volatile. Trading in this market has become a very risky job for the small investors. As losing capital from this market, people are not interested to further investment in the market. It has also direct effect on the investment of other sectors.

**iii) Current Productive Capacity:** The amount of output per unit of input achieved by a firm, industry, or country is called the productive capacity of the economy. This may be per unit of a particular factor of production, for example labour employed, or per unit of land in agriculture, or total factor productivity may be measured, which involves aggregating the different types of factor. The productive capacity of Bangladesh is very low and the labour productivity is 1:3 compare to the US labour. This is why; the investment in Bangladesh is very poor.

**iv) The Profitability of Current Investment:** The profit earning capacity for the expected level for the firm is called the profitability of current investment. The more expected level of earning profit by the firm is the more level of domestic investment. In Bangladesh, the expected earning capacity of profit is very low; resulting is the low level of domestic investment.

**v) The Exchange Rate:** An exchange rate is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency (Heim, 2008), which affects the relative prices of foreign and domestic investment. The exchange rate in Bangladesh is very much volatile for which investment figure is also be hampered.

**vi) Savings Rate:** Saving is one of the major components of domestic investment. The more savings rate, the more the capital formation, the more domestic investment is the macroeconomic theory. In Bangladesh the saving rate is very low and it stands to 23.47 percent of GDP in 2013-14, the investment is thus is very low 28.69 percent.

**vii) The Extent of Government Deficit:** Government borrowing which diverts savings that would otherwise be borrowed by businesses to purchase new plant and equipment into government hands, reducing the level of private investment. Crowd out theorists argue this competition between business and government for savings forces interest rates up, reducing the amounts business find profitable to borrow to invest.

**viii) Consumer Price Index:** A price index covers the prices of consumer goods. This is contrasted with a more general price index, such as the "GDP deflator" which also includes investment goods and goods purchased by the government. The consumer price index in Bangladesh is comparative high that may inspire the domestic firms to invest more in the country.

**ix) Macroeconomic Instability:** Macroeconomic instability refers to phenomena that make the domestic macroeconomic environment less predictable and it can take the form of volatility of key macroeconomic variables or of unsustainability in their behaviour. The investment pattern in Bangladesh is very poor because of the high rate of macroeconomic instability. The weak macroeconomic stability is shown by the following Table 4.1.6.1:

**Table 4.1.6.1: Bangladesh's Progress in Macroeconomic Stability**

| Major Macroeconomic Factors | 1980 | 1990 | 2000 | 2010 | 2011 |
|---|---|---|---|---|---|
| Human Development Index | 0.259 | 0.313 | 0.390 | 0.469 | - |
| Population below National Poverty Line (%) | - | 58.8 | 49.8 | 40.0 | 31.50 |
| Fertility Rate (birth per woman) | 5.0 | 4.3 | 3.0 | 2.2 | 2.11 |
| Infant Mortality Rate (per thousand people) | 101.4 | 94.0 | 66.3 | 43.0 | 35.0 |
| Life Expectancy at birth (years) | 56.9 | 56.0 | 60.6 | 66.9 | 69.0 |
| Gross Primary Enrollment Ratio (%) | 61.0 | 72.0 | 97.5 | 93.8 | 114.20 |
| Gross Secondary Enrollment Ratio (%) | 18.0 | 19.0 | 42.0 | 44.1 | 50.80 |
| Adult Literacy Rate (age 15 and older (%)) | 29.0 | 35.0 | 45.0 | 55.0 | 58.79 |

Source: UNDP, Human Development Report 2012.

Table 4.1.6.1 indicates that Bangladesh has achieved improvement in every field of macroeconomic factors but nothing has happened yet as expected that provides a poor macroeconomic stability here. Table also shows that all macroeconomic factors are remaining below the standard level in Bangladesh.

**x) Infrastructure:** Well-functioning economic infrastructure will enhance productivity, underpin industry expansion and create the conditions for major jobs growth. It improves business efficiency through increased connectivity, supports economies of scale, increases labour market flexibility and opens up new markets. The domestic investment is not so satisfactory in Bangladesh due to the poor pattern of country's socio-economic infrastructures.

**xi) Countries Political Atmosphere:** The political climate is the aggregate current mood and opinions of people about political issue that also currently affect that population. The Bangladesh Economic Review (2013) shows that the current growth rate of public investment are higher than the private sector. Does it mean that the private sector has limited capacity to invest? Many experts say that the private sector is taking time to take decisions regarding investment due to current political instability, unrest and violence in the country. Without a stable democratic environment, it is quite difficult to ensure expected return on investment. Therefore, both local and foreign investors are observing the situation before investing in Bangladesh (Abedin, 2014).

**xii) Corruption Perception Index (CPI):** The corruption perception index (CPI) is highly significant and negatively related to private investment. Corruption is another biggest barrier of investment in Bangladesh. Recent corruption cases like Hall-Mark, Bismillah, Destiny, researve hacking of Bangladesh Bank etc. have damaged the confidence for investment in the country.

Besides, bureaucratic complexities in getting regulatory permission and required certification are frustrating the small and medium entrepreneurs. Big entrepreneurs could manage bureaucracy through political pressure or offering bribes but small and medium entrepreneurs are facing trouble in this regard. Law-enforcement agencies, regulatory agencies, including police and customs, have to be pro-business. Currently, small businesses are being hampered by a dishonest section of these agencies.

### 4.1.8 Conclusion

Bangladesh's economy witnessed a somewhat positive growth in 2014, but still far from the robustness required to become a middle-income country by 2021. Infrastructure bottlenecks, erratic power supply to industrial units, low rate of revenue collection, sluggish investment, poor performance in external sector, and lack of investment-friendly atmosphere, combined with the political uncertainty resulted in the country failing to achieve the expected growth, economists and business leaders observed (Hossain, 2014). The country now needs a lot more resources to invest in physical infrastructure as well as for the development of power and gas sectors, which are among the major causes of the sluggish private investment in the country. The power sector alone will need as much as $10 billion of new investment, which cannot be generated from domestic sources. This section however, explains the present scenarios of domestic investment of Bangladesh and the factors associated with the domestic investment. The investment policy and the given incentives for the domestic entrepreneurs have also been discussed throughout this section. The analysis indicates that most of the factors of investment are unfavorable for the domestic investment in Bangladesh.

## Section 2: An Overview of FDI in Bangladesh

### 4.2.1 Introduction

Inward FDI to the developing countries has the evidence as a major stimulus to the economic growth; conventionally at export-oriented manufacturing sector. In point of fact, basic macro fundamentals like growth rate of gross domestic product, gross capital formation, foreign reserve, exchange rate; infrastructure etc. accelerates the FDI inflows. This study reviews the long run trend on the time scale of FDI to Bangladesh over the period 1972-2013 and major factors determining foreign companies' decisions to invest, in associated with economic growth. Important economic concepts are used to discuss details of how FDI inflows enhance the production capacity of the economy and raise employment levels. This leads to an increase in exports that allows the country to earn foreign currency with which to pay for external debt, import volumes, and further inflows of FDI. The process continues to help sustain economic growth (Ahamad & Tanin, 2010). This section however, discusses the over all trend of FDI in Bangladesh that is, the historical overview of FDI, current pattern of FDI, sector wise FDI inflows in Bangladesh, the adopting policies by the government, the affecting factors of FDI in Bangladesh, the cost and benefits of FDI, the incentives given by the government etc. have been discussed with necessary data, tables and graphs throughout this section.

### 4.2.2 Historical Overview of FDI Inflows in Bangladesh

In focusing on the history of FDI in Bangladesh, the study provides an overview of the different policy measures the government of Bangladesh has implemented since the country's independence in late 1971. Until 1985, GNP per capita did not manage to grow nearly as fast as other low income countries. In trying to overcome this stifled growth, external pressure from foreign donors induced the government to privatize major industries and adopt economic reforms of its investment policies as a means to attract more FDI and boost economic growth. Bangladesh was the second favoured investment destination in South Asia in 2013, according to UNCTAD. But, it cannot be said that it has harnessed even a fraction of its potential in attracting FDIs.

From the early stage of 1980s, many of the least developed countries, including Bangladesh, were skeptical of the intentions of FDI and perceived it as a tool for promoting foreign interests. Consequently, a wide array of restrictions were imposed to control FDI inflows through regulations on profit and dividend repatriations, limits on foreign equity and capital, and required royalty payments. In an increasingly globalizes world economy, countries have now lifted such barriers to open their economies and take advantage of the benefits of foreign investment. Inflows of FDI in Bangladesh have grown from a trickle during the 1980s above $300 million towards the end of 1990s; in 2005, it stood at about $692 million. Factors that have led to this dramatic rise and in order to better understand them, it is necessary to discuss the history of the economic policy implemented by the government of Bangladesh since the country's independence from Pakistan in 1971. Immediately after the birth of the sovereign nation, the new government attempted to establish a socialist state and adopted the Nationalization Order of 1972 to foster economic growth. 86% of the industrial sector was brought under government control, including key industries such as sugar, jute, and cotton textiles.

The nationalized industries, however, were inefficient and the economy experienced low growth. Consequently, Bangladesh has undergone a series of policy reforms to induce a more capitalistic economy by progressively increasing funding allocations to the private sector; these reforms include the Two Year Plan (1978-1980), the Second Five Year Plan (1980-1985), the Third Five Year Plan (1985-1990), and the Fourth Five Year Plan (1990-1995). To accelerate the development of the economy, foreign investment became a priority and in 1980, the Bangladesh Parliament approved the Foreign Private Investment Act. FDI, however, rose very little owing to the upheld trade restrictions and the Investment Act of 1989 soon followed to establish the Board of Investment (UNCTAD 2000), the primary objective of which is aimed at attracting and facilitating investment from abroad.

### 4.2.3 Recent Trend of FDI in Bangladesh

Foreign direct investment to developing countries has increased substantially in the nineties. However, Bangladesh has lagged behind and received low FDI inflow compared to other developing countries. The expectations of private investors in a host country are guided by a host of economic, institutional and regulatory and infrastructure related factors. Some of the fundamental determinants of FDI, such as geographical location, resource endowment and size of the market, are largely outside the control of the national policy. However, national economic policies to create a conductive investment environment and particularly the investment framework can help to make FDI inflows consistent with economic potential. Sound macroeconomic fundamentals, along with other factors such as stable exchange rate policies, low inflation, and sustained growth, influence the decision of investors in a host country (Ahamad & Tanin, 2010).

Bangladesh is well positioned as a favourable investment destination because of its large and growing local markets. Bangladesh economy reflected the efforts of the Board of Investment with increasing in FDI inflows, particularly throughout the 1970s. It is important to emphasize the years between 1995 and 1998 which saw the sharpest and most sudden rise in FDI inflows. This period can be attributed to a variety of factors. During the mid-1990s, numerous foreign enterprises led exploratory research campaigns into the nation’s natural gas reserves, which have an estimated capacity greater than 10 trillion cubic feet according to the U.S. Geographical Survey. Given the world’s scarce resources, external pressure finally urged the Bangladesh government into liberalizing the energy sector, a move which almost immediately attracted increasing levels of FDI. Concurrently, the government also eased capital controls and reduced its bureaucratic red tape to allow private firms to borrow foreign loans without governmental permission, thus encouraging more joint ventures with international companies. In 1995, the Bangladesh government opened up the mobile telecommunication industry for private investment, an area which has fostered technology transfers as well as hundreds of millions of dollars in FDI. All these reforms and policies combined to shape Bangladesh into the nation that it is today. The FDI inflows in Bangladesh over the year given by the following Table:

**Table 4.2.3.1: Year Wise FDI Inflows in Bangladesh (**as Percentages of GDP**)**

| Year | Value | Year | Value | Year | Value | Year | Value | Year | Value | Year | Value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 0.00 | 1979 | -0.05 | 1986 | 0.01 | 1993 | 0.04 | 2000 | 0.59 | 2007 | 0.95 |
| 1973 | 0.03 | 1980 | 0.05 | 1987 | 0.01 | 1994 | 0.03 | 2001 | 0.17 | 2008 | 1.27 |
| 1974 | 0.02 | 1981 | 0.03 | 1988 | 0.01 | 1995 | 0.00 | 2002 | 0.11 | 2009 | 0.82 |
| 1975 | 0.01 | 1982 | 0.02 | 1989 | 0.00 | 1996 | 0.03 | 2003 | 0.58 | 2010 | 0.91 |
| 1976 | 0.05 | 1983 | 0.01 | 1990 | 0.01 | 1997 | 0.33 | 2004 | 0.79 | 2011 | 0.92 |
| 1977 | 0.07 | 1984 | 0.00 | 1991 | 0.00 | 1998 | 0.43 | 2005 | 1.35 | 2012 | 1.11 |
| 1978 | 0.06 | 1985 | 0.00 | 1992 | 0.01 | 1999 | 0.39 | 2006 | 1.13 | 2013 | 1.00 |

Source: IMF, International Financial Statistics and Balance of Payments Databases; World Bank (WDI, 2014), International Debt Statistics, and OECD GDP Estimates.

Table 4.2.3.1 states the net inflow of foreign direct investment (% of GDP) in Bangladesh is 0.91 as of 2011. Its highest value over the past 42 years was 1.35 in 2005, while its lowest value was 0.05 in 1979. The figure is rising continuously and stands to 1.00 percent in 2013 while it was 1.11 in 2012 in Bangladesh. Inflows of foreign direct investment into Bangladesh rose 24 percent year-on-year to $1.6 billion in 2013 although the country witnessed serious political unrest and an anti-business climate during the period. FDI inflows increased 13.75 percent to $1.29 billion in 2012, compared to the previous year, according to United Nations Conference on Trade and Development

(UNCTAD, 2014). The FDI inflows were $0.70 billion in 2009, $ 0.91 billion in 2010 and $1.14 billion in 2011 indicating a steady upward trend.

The World Investment Report of the UNCTAD, released recently, shows Bangladesh is placed as a second favoured investment destination in South Asia after India, which got $ 28 billion or 78 percent of the total FDI inflows into the region in 2013. Pakistan stood third in South Asia with $1.3 billion. The Board of Investment (BoI) of Bangladesh released the UNCTAD, 2010 report at a press conference at its office in Dhaka recently. Of the $1.6 billion FDI that Bangladesh received by 2009, $541 million came as equity (direct investment in Bangladesh), $361 million as intra-company loans (debt transactions between parent enterprises and affiliates) and $697 million were reinvested earnings (investors' share of profits not distributed as profits).

### 4.2.4 Sector Wise Trends of FDI Inflows in Bangladesh

A prominent feature of FDI inflows in Bangladesh is that the bulk of the FDI is concentrated in the non-tradable services sectors (Table 4.2.4.1), which hardly contribute anything to export earnings but generate repayment obligations in respect of profits, dividends and repatriation of capital.

**Table 4.2.4.1: Distribution of FDI Inflows by Sector in 2008 and 2009** (million US$)

| FDI Sectors | 2008 | | 2009 | | % change 2009/2008 |
|---|---|---|---|---|---|
| | US$ m | Share (%) | US$ m | Share (%) | |
| Services | 884.17 | 81.39% | 443.86 | 61.99% | (-)49.8% |
| Power, Gas & Petroleum | 101.02 | 9.30% | 51.15 | 7.31% | (-)49.4% |
| Banking | 141.76 | 13.05% | 142.57 | 20.35% | 0.57% |
| Telecommunications | 641.39 | 59.04% | 250.14 | 35.73% | (-)61.0% |
| Manufacturing | 163.68 | 15.07% | 172.71 | 24.12% | 5.5% |
| Food Products | 22.89 | 2.11% | 24.54 | 3.51% | 7.2% |
| Textile and Wearing Apparel | 126.36 | 11.63% | 136.38 | 19.48% | 7.9% |
| Agriculture and Fishing | 14.43 | 1.33% | 11.79 | 1.68% | (-)18.3 |
| Others | 38.48 | 3.54% | 99.43 | 13.89% | 158.4% |
| Total | 1,086.33 | 100.00% | 716.00 | 100.00% | 34.1% |

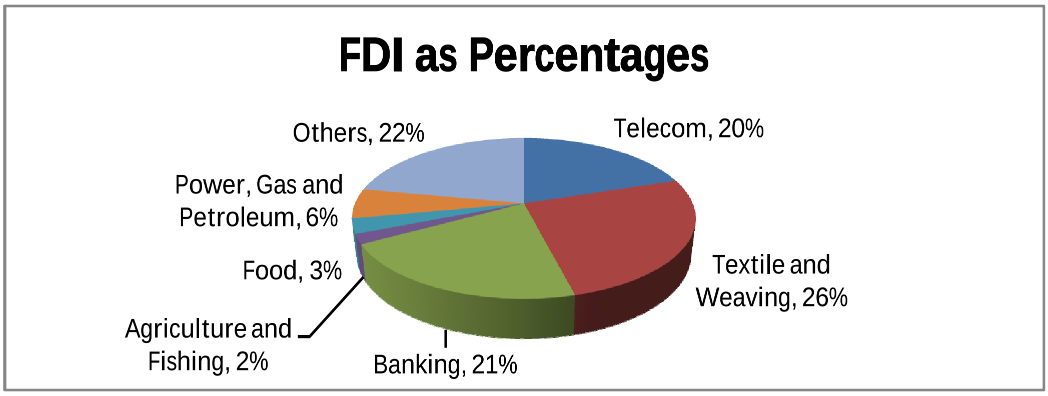
Source: Bangladesh Bank FDI Survey Report, July-December, 2009; UNCTAD, WDI, 2010.

Table 4.2.4.1 shows the composition of FDI changed in the direction of manufacturing and other tradable sectors in 2009, but even then the services sectors are accounted for 62 percent of total FDI inflows. In telecoms, FDI inflow declined by 61 percent, to $250 million in 2009 from $641 million in 2008. In power, gas and petroleum sectors, FDI fell by 49 percent and stood at $51 million in 2009, as against $101 million in the year before. However, the FDI inflow in textile and wearing apparel increased by 8 percent and stood at $136 million in 2009. In 2008, the inflow was $126 million. In the banking sector, FDI inflows remained about the same as in the past year ($141). A significant change in the composition of investment is noticed in the investment proposals registered with the BOI in 2010. In the proposals, the highest 30.8 percent of the investment was offered for the services sectors. The proposed investments for other sectors were 30 percent for textiles, 18.8 percent for chemicals, 7.8 percent for engineering, 6.6 percent for agriculture, and 4.4 percent for food and allied sector (Bhuyan, 2011). In 2003, the manufacturing sector received the majority of foreign investment inflows. A vital part of this was owing to the success in textiles through the ready-made garments industry. Owing to increased privatization efforts by the government, telecom has emerged as one of the fastest growing sectors in the Bangladesh economy. Much of this can be explained by the increased competition between large private corporations that have magnified efforts to attract FDI and attain better technology to optimize profits. The country's natural gas reserves partially explain this. Another factor is the country's difficulty in generating electricity. The lack of production capacity causes the government to frequently 'load shed' power, by imposing blackouts 12 in areas of low power usage to meet the needs of areas of higher power usage. Hence, the energy sector offers much scope for foreign investment as the government lacks the capital and liquidity of building power-grids and expanding the country's electric capacity. Report also shows that the FDI inflows into different sectors in 2013, telecommunications got $324 million (20%), mainly for the payments of 3G license fees and network expansion of the mobile phone operators. The banking sector, especially the foreign banks, got $327 million (21%) to meet their statutory capital requirements under Basel II obligations. Textile and weaving got $422 million (26%), power, gas and petroleum $99 million (6%), food products $40 million (3%), agriculture and fishing $31 million (2%) and others $356 million (22%). The FDI inflows in different sectors of Bangladesh are shown by the following Pie Chart:

Figure 4.2.4.1 shows that the textile and weaving sector are the major destination of FDI inflows in Bangladesh and it shares 26% of inflows in 2013. Agriculture and Fishing is the lowest destination and it occupies only 2% of the foreign investment in Bangladesh. Telecom and Banking sectors are also another two attractive sectors for FDI inflows in Bangladesh and share are 20% and 21% respectively. The Pie Chart expresses how the dimensions of FDI inflows have changed in recent years. The reduction in FDI shares of manufacturing demonstrates that it is no longer a stronghold for foreign investment and other sectors, such as telecom and based on percentages gathered from the Bangladesh

Board of Investment 2013. The smallest, miscellaneous proportions include services in finance, engineering, and computer software.

**Figure 4.2.4.1: FDI Inflows in Bangladesh by Sectors as Percentages in 2013**




Source: Board of Investment (Siddiqui, Daily Independent, December 17, 2014).

But, it continues to be a matter of some disappointment that foreign investors still prefer other countries in the South Asian region, Pakistan and Sri Lanka for instance, over Bangladesh as their destination. Pakistan is today torn by sectarian strife. Bangladesh, in comparison offers a far safer place for investment. It did not suffer from a terrible anti-insurgency fight like Sri Lanka did, and for which Sri Lanka’s FDI flow also dipped sharply. The remnants of the militant bands in Bangladesh are on the run and the government is firmly committed to fight extremism.

### 4.2.5 Factors Affecting FDI in Bangladesh

All the factors affecting FDI in Bangladesh can be grouped into two categories (i) the economic conditions and (ii) the host country policies. *Economic conditions* include market size, growth prospect, rate of return, urbanization/industrialization, labour cost, human capital, physical infrastructure, and macroeconomic fundamentals like inflation, tax regime, external debt, etc. *Host country policies* on the other hand, include the promotion of private ownership, efficient financial market; trade policies/free trade policy/regional trade agreements, FDI policies, and perception of country risk, legal framework, and quality of bureaucracy. Empirical research suggests that FDI is sensitive to the host country’s overall economic policies, including its tax policy. Besides these, the Research and Development (R&D), the consumption pattern of the nationals, the corruption index of the country, etc. also the affecting factors of the FDI inflow in Bangladesh. That is, the more research and development the more absorptive capacity of the country and the more international investment. The consumption of the citizen of the county may create the market of the MNE’s product that also attracts them to invest more in the host country like Bangladesh.

### 4.2.6 Investment Policy in Bangladesh

#### 4.2.6.1 Investment Policy (1980) Regarding FDI in Bangladesh

a) Foreign investment, with particular preference to foreign direct investment will be encouraged in all industrial activities in Bangladesh including service industries and toll manufacturing, and ready made garments, banks, insurance companies and other financial institutions excluding "Reserved Industries".

b) The policy framework for foreign investment in Bangladesh is based on Foreign Private Investment (Promotion and Protection) Act, 1980.

c) For foreign investment, there will be no limitation pertaining to equity participation i.e. 100 percent foreign equity will be allowed.

d) Foreign entrepreneurs will enjoy the same facilities as the domestic entrepreneurs in respect of tax holiday, payment of royalty, technical know-how fees etc.

e) Full repatriation of capital invested foreign sources will be allowed. Similarly profits and dividend accruing to foreign investment may be transferred in full.

f) The process of issuing work permit to foreign experts on the recommendation of investing foreign companies or joint ventures will operate without any hindrance or restriction.

g) Foreign investment in "Thrust Sectors", particularly in small industrial units, will be given priority in allocation of plots in BSCIC industrial estates.

h) Investment of non-resident Bangladeshis will be treated as par with foreign direct investment.

i) Measures will be taken to protect the intellectual property rights of new products and processes.

j) Investment guarantee and dispute settlement will be guided by international arrangements and provisions.

#### 4.2.6.2 Investment Policy 1982

According to the investment policy 1982, foreign investment is emphasized in the following categories:

1. High-tech products be it either import-substitute or exportable products.
2. Export related industries.
3. Industries which will use indigenous natural resources.
4. Industries mainly based on local raw materials.

5. Investments directed towards the improvement of quality of the manufactured goods.
6. Investments to develop the marketing strategies and enhance the production capacity of the existing industries.
7. Investments toward labor intensive industries.

#### 4.2.6.3 Facilitative Role of the Public Institutions

The following is the investment framework for the development of the private sector in Bangladesh:

a) All foreign investments shall be registered in the prescribed manner with the concerned promotional body before setting up an industry.

b) Prior clearance will be required for setting up of ready-made garments (RMG) units, banks, insurance companies and other financial institutions.

c) Bangladesh Small and Cottage Industries Corporation (BSCIC) will allot industrial plots to respective industrial units in its own industrial estates and estates developed by it under special orders.

d) Concerned facilitating agencies will, after discussion with the relevant authorities, determine the time limit for receipt of power, gas, water, drainage and telecommunication connection as well as provide clearance relating to environment pollution. These facilities will be provided by the "One Stop Service" cell of the facilitating agencies.

e) BOI, BEPZA and BSCIC will approve, wherever necessary, the payment of any royalties, technical assistance fees and approve appointment and payment of remuneration of foreign personnels.

f) Private sector is allowed to set up export processing zones and develop industrial parks. Government will extend support to these zones and parks.

### 4.2.7 Investment Opportunity in Bangladesh

Bangladesh is considered to be an unexplored gold mine in terms of investment in the Indian subcontinent. Because of its political ups and downs, it could not render the opportunity in front of the investment market yet. But the world has already started to know what opportunity it has. It can offer various unique financial opportunities in different sectors like Agriculture, Agro based industries, Textile, Garments, Leather goods, Jute goods, Power sector, Telecommunication, Tourism, Frozen foods, Sea food, computer related industry etc. The World Bank in its report ‘Doing Business 2010’ has ranked Bangladesh in the 20th position for ‘Protecting Investors’- much above India (40), China (93), and Vietnam (172). For ‘starting a business’, Bangladesh was positioned at 98, showing a more favourable investment environment compared to India (169), China (151), and Vietnam (116). With this context, Global multinationals such as Mobil, BP, Procter & Gamble, and Lafarge etc. have their strong presence in Bangladesh. Bangladesh offers various types of incentives for foreign and domestic private industries. For example: Tax holiday facilities are available for five or seven years depending on location of the industries. Industries not enjoying the facility of tax holiday will be allowed accelerated depreciation. Reduced import duty on imported capital machinery, even value-added tax (VAT) is not payable for imported spare parts and capital machinery. Special incentives are provided to encourage non-resident Bangladeshis for investment in Bangladesh so they will enjoy facilities similar to those of foreign investors. Tax exemption is imposed on private power Generation Company. Reinvestment of the dividend will be regarded as new investment. $75,000.00 investment in Bangladesh will qualify for permanent residency. Attractive facilities and support for venture capital will be available to export oriented industries in specific areas. The foreign investors are protected from double taxation upon bilateral agreement. Export oriented industries (industries exporting at least 80% of its manufactured goods or contributing at least 80% of its products as raw materials for finished exportable goods will be considered as an export oriented industry) will be given priority for investment.

Besides, measures have been taken to facilitate the investment and to give incentive to the domestic and foreign investors by liberalizing the exchange control regulations (Bangladesh Bank and BoI, 2014). Foreign investors in greater number are still not convinced that mid and longer term energy supplies in Bangladesh will continue to improve significantly. Although production and availability of energies like power and gas have notably improved in the last couple of years, there is still a long way to go for the foreign investors to be assured that energy supply here will be able to go on matching their desired rate of investments in this country. However, there are many prospects for FDI in Bangladesh. Yet, even in the South Asian ranking of FDIs, Bangladesh’s position is not substantially above Pakistan and other countries which are suffering relatively greater instability and violence (Sdddiqui, 2014). Therefore, it needs to be carefully researched by the policy planners the main reasons why Bangladesh is receiving FDIs far below its true potentials.

### 4.2.8 Benefits and Costs of Foreign Direct Investment in Bangladesh

It should be understood that FDI is not an unmixed blessing for Bangladesh. There are benefits and costs accompanying foreign investment. The task for policy makers and analysts is to ascertain the determinants of the benefits and costs, and attempt to devise policies to increase the benefits and reduce the costs, with the aim of ensuring that there are net benefits. Net benefits of FDI will be maximized and lead to fruitful, balanced growth of the economy under certain conditions.

#### 4.2.8.1 Benefits of Foreign Direct Investment in Bangladesh

In Bangladesh, the FDI inflows have some benefits for the economy. Like many other developing countries, Bangladesh also enjoys a basket of benefits of FDI those are discussed as follows:

**i) Overcoming Domestic Resource Constraint**: FDI closes the domestic resource gap by providing an outside source of financing for investment. FDI inflows are considered to be more stable and easier to service than other sources of foreign private capital such as commercial debts or portfolio investment.

**ii) Raising the Productivity of Labour and Capital:** FDI raises the productivity of labour, and so raises the quality of employment. Economies of scope and scale and managerial efficiency can raise the productivity and returns of all production inputs. This leads to an increase in the real wages for workers and increases in the real rate of return to the domestic capital of Bangladesh.

**iii) Generating Employment:** By creating new productive facilities, FDI creates more jobs in the Bangladesh economy. Increased employment, like investment, will have a multiplier effect on the economy and stimulate a dynamic growth cycle.

**iv) Easing the Balance of Payments Constraints:** FDI leads to an improvement in the host country’s balance of payments and possibly also terms of trade. Foreign investment constitutes an inflow on the capital account and therefore allows the economy to sustain the deficit on the current account without devaluing the currency or introducing austerity measures.

**v) Raising Exports:** Export-oriented TNCs raise exports significantly in Bangladesh. This is in fact one reason why developing country’s governments try to attract FDI through the creation of export processing zones (EPZs).

**vi) Access to Technology:** FDI brings in new technology, which may have positive spillover effects for other local firms.

**vii) Access to Markets:** TNCs help Bangladesh to gain easy access to the lucrative markets of the rich countries.

**viii) Benefits to Environment:** TNCs have better access to and knowledge of environmentally sound technologies and are expected to bring such technologies to the economy of Bangladesh.

**ix) Benefits to Consumers:** Consumers are likely to benefit from increased FDI inflows in the form of lower prices and improved product quality when the investment is cost-reducing and product-improving. Benefits also accrue to consumers of Bangladesh because FDI is likely to introduce new products and thus widen the choice in consumer goods markets.

**x) Revenue of the Government:** FDI also contributes hugely to increase revenue to the government so that it can maintain her budget deficits Bangladesh.

#### 4.2.8.2 The Costs Associated with FDI in Bangladesh

FDI poses some real risks for the economy of Bangladesh. It is evident that the East Asian growth success is based mainly on high domestic savings rather than FDI, although FDI has many advantages as mentioned above. The costs that have associated with the so called FDI in Bangladesh are as follows:

**i) Impact on Domestic Savings:** The effect of FDI may be offset by redistribution of income away from domestic capital if the foreign investment competes with home investment and reduces profits of domestic industries. The consequent reduction in domestic savings is an indirect cost of foreign investment in Bangladesh.

**ii) Decapitalization Effect:** FDI generates both positive and negative effects on the flow of foreign exchange on two accounts: financial and trade. On the financial side, FDI brings in capital, but also leads to a stream of return flow of profit, other investment incomes and accumulated interest, and repatriation of capital in Bangladesh.

**iii) Impact on Domestic Investment:** FDI may ‘crowd out’ domestic investment. Since they have access to cheaper capital than most firms in the host country, TNCs (Transnational Corporations) are able to snap up profitable investment opportunities that domestic investors would have made if they had the chance. They can thus raise entry costs for local firms, or deprive them of the best factor inputs.

**iv) Impact on Domestic Competition:** FDI and in particular M & As are likely to have a negative impact on the level of competition in the domestic market. Developing countries like Bangladesh are understandably concerned that the takeover of domestic firms by giant TNCs will allow them to engage in anti-competitive practices and abuse of their dominant market positions.

**v) Denationalization Effect:** Too rapid a buildup of FDI could lead to "denationalization", where the ownership of firms is transferred from domestic to foreign hands and the foreign share of the nation's wealth stock increases relative to local share in developing countries like Bangladesh.

**vi) Financial Instability:** Profit remittance and profits retained (profit re-investment) by the subsidiary are now significant components of FDI flows in many host countries (UNCTAD, 2014). These are highly volatile and indeed can be just as volatile as portfolio investment flows, especially during an economic crisis in Bangladesh in, 1996 and 2010-2011.

**vii) Effects on Balance of Payments:** FDI has a positive effect through higher export earnings and a savings on imports, but a negative effect through higher imports of intermediate and capital goods. If investors import more than they export, FDI can end up worsening the balance of payments situation of Bangladesh.

**viii) Risk of Loss of Control over Strategic Sectors:** The politico-strategic interests of Bangladesh may be at stake, if FDI comprises a large component of total investment and involves loss of local control over strategic sectors, infrastructure and natural resources.

**ix) Effect on Research & Development:** Foreign direct investments usually tend to be made in technologically advanced industries, but research for further development of these key industries tends to be located in the investing country. The tendency, inherent in direct investments, to lead to a reallocation of research activities could also induce scientists and technicians to leave their own country and move to the investing country - a phenomenon popularly called the "brain drain". Bangladesh is no doubt faced with the cost of brain drain.

**x) Cost of FDI Incentives:** Given the limited supply of global FDI, less resourced countries compete fiercely with one another to attract foreign investment. Bangladesh may have to attract FDI engaging in reckless competition on incentives to establish specific

EPZs, where businesses are offered a combination of reduced tax rates, tax holidays, subsidies, and reduced regulation.

**xi) Environmental Degradation:** Economic activities in anyhow degrade or pollute environment of a country. The multinationals often invest to the chemical, leather and some other heavy manufacturing sectors. But, these industries occur pollution of the environment. In case of Bangladesh, it has become the more concern and the matter have been heavy threat of environmental degradation recently. The FDI inflows are in many cases responsible for such kind of degradation.

All these factors have to be taken into account in an overall net evaluation of the costs and benefits of FDI inflows in Bangladesh. A UN economist, addressing a seminar in Dhaka in 2014 is that FDI should not be considered indispensable for economic progress. Countries like Taiwan, Korea, Japan, China and even western economies did not rely much on foreign investment. Economic progress there was actually always laid by the domestic ventures.

### 4.2.10 Conclusion

In order to meet up the objective of this study of assessing the current trends and pattern of FDI in Bangladesh, this section analyzes the historical background of FDI, current trend and pattern of FDI, FDI inflows to the neigbouring countries, factors affecting FDI in Bangladesh, the investment policy for FDI, the incentives given for FDI, the benefits and costs of FDI in Bangladesh etc. with numerical data, tables and graphs. There are many prospects for FDI in Bangladesh. The nation has many resources and scope to yield many advantages and opportunities for foreign investors. The government and economy have also been made very conducive to investment through a series of reforms allowing the nation to become the most liberalized trade regime of the South Asian region. In many aspects, it is still viewed as an FDI under performer and the country is far from achieving its full potential. Considering policy brief, the Bangladesh Board of Investment has taken measures to transform the country into the most liberalized investment regime in the South Asian region. Lessons of economic theory and historical evidence indicate that not all FDI is conducive to development. Some kinds of FDI may even do more harm than good. Hence, the policy to embrace all types of FDI without screening may cause serious long run economic difficulties, thereby harming the country’s development prospects. To limit the risks, and avoid harmful effects on the economy, government of Bangladesh should take a selective policy to FDI.

## Section 3: An Overview of Trade Openness in Bangladesh

### 4.3.1 Introduction

The concept of trade openness and free trade is highly debatable topic in economics. It is always assumed to be a very important source of economic growth. Trade openness can have a positive effect on economic growth, exports, imports, FDI and remittance of a country. Trade liberalization policy in 1990 opened up the opportunity for the Bangladesh economy to enhance economic growth and foster overall development. The history of Bangladesh's economy starts in the 1960s, where the then East Pakistan's economy grew by an annual average rate of around 4 percent. The economy of Bangladesh accelerated sharply from 1990 due to mainly trade openness and restoration of democracy (Islam, 2001). In the last two and half decades, Bangladesh economy was characterized by successful expansion of export-oriented garment industry, high-yield variety rice production, leather products, tea and remittances. These enabled Bangladesh to survive the decline of the world market for its former stable exports of jute and jute textiles, and to redeploy its resources in line with its comparative advantage. This phenomenon is pointed out as a positive contribution of liberal trade policy (Ahmed & Sattar, 2004). As the part of the objective one, this study assesses the current trends and pattern of trade openness in Bangladesh economy between the periods 1972 to 2013. This section analyzes the achievements of the economy in terms of important variables such as the overview of global trade, trade with South Asian regions, growth, inflation, export and import before and after trade liberalization, trade liberalization policy of Bangladesh, openness trend over the periods, the benefit and costs of trade openness in Bangladesh etc.

### 4.3.2 An Overview of Global Trade

International trade plays an important role in the development of any economy and assumed to be an engine of growth. Trade is taking place not only in terms of commodities but also in terms of technology, flows of ideas and knowledge spillover. International trade affects economy through different channels. It creates employment; generate capital formation that leads to better living standards in terms of higher level of GDP and GDP per capita. Over the past few years, the world trading system is becoming progressively open and competitive. Tariffs are reducing in both developed and developing countries and restrictions are eliminating.

Table 4.3.2.1 (in Appendix) shows that the growth rate of import and export of developed countries increases to 1.4 percent and 2.3 percent respectively in 2013 whereas, the figures were 1.1 and 2.1 percent in 2012. The average growth rate of imports of developing and rising economies decreases a bit and stands at 5.6 percent in 2013 and it was 5.8 percent in 2012. The growth rate of exports of the developing and rising economies rises a bit to 4.4 percent in 2013, while the figure was 4.2 percent in 2012. From the analysis of the estimation, the growth rate of exports and imports of developed economy may increase a bit to 3.5 percent and 4.2 percent respectively. On the other hand, the growth rate of developing and rising countries may decrease to 5.2 percent and rate of exports may increase to 5.0 percent in 2014. Table finally indicates that world economy may turn to the economic stability.

### 4.3.3 Trade of Bangladesh with South Asian Regions

Economies are trying to adopt outward-looking economic policies, also looking for the ways to promote growth and employment through expanding export production and attracting inward investment. South Asia is economically one of the less developed regions of the world per capita income of US$ 1,565. The South Asian economies mostly followed protectionist trade policies during their initial phases of development. The prime principles behind the restrictive trade regimes were protection of the domestic industries from foreign competition and conservation of foreign exchange for balance of payments support. South Asia is also assumed to be less integrated region of the world in terms of the trade of commodities, capital and ideas whereas, intraregional trade is very low for South Asia *i.e.* intraregional trade is less than 2 percent of GDP, compared to more than 20 percent for East Asia (Sarma and Siddiqi, 2011).

Table 4.3.3.1 (in Appendix) shows that in term of export to the SAARC countries from Bangladesh, India secured the top position and in FY 2011-12, its quantity among the SAARC countries is about 79 percent. It is to be noted that export in the SAARC countries in FY 2011-12 compared to the total export of Bangladesh is only about 4 percent.

### 4.3.4 Trade of Bangladesh with Rest of the World

International trade is increasing from the getting rid of the world recessions for last several years over the world. The growth rate of world trade stands at 3.00 percent in 2013 while it was 2.8 percent in 2012. The estimated growth rate of world trade may rise to 4.3

percent and 5.3 percent in 2014 and 2015 respectively (World Economic Outlook, April 2014).

Table 4.3.4.1 (in Appendix) presents import volume of China which is the highest in 2013-14 in examining the country-wise import expenditure of Bangladesh. A 19.0 percent of total import expenditures are spent from China in the same year. India and Singapore are remained in the second and third stages respectively and they occupy 13.7 and 6.0 percent of the import spending of Bangladesh in the year 2013-14. Total import expenditure stands at 18,747 million US$ in the first six months (July-December) 2013-14 whereas, it was 16,454 million US$ in previous years compared to the same period.

Table 4.3.4.2 (in Appendix) presents the analysis of country-wise export which shows that USA is the main destination of our export. It appears that in FY 2011-12, USA secured the top position in respect of importing commodities from Bangladesh. During the period the export earnings from USA was US$ 5100.9 million, which was 21 percent of country's total export earnings. The other Bangladeshi export destinations like Germany (15.2 percent), UK (10.1 percent), and France (5.7) have their respective positions.

Country's overall export earnings in the outgoing calendar year (2014) witnessed a mixed trend of both positive growth and fall as some of the major exportable items found it hard to meet the export target throughout the year, especially in its later part, reports UNB. According to the latest statistics provided by the Export Promotion Bureau (EPB), the country's export earnings totalled $ 12,070.08 million during the July-November period of the fiscal year 2014-15 with a mere 0.92 per cent growth compared to the same period of last fiscal year. The figure is, however, 5.23 percent short of the target of $ 12,735.52 million for this five-month period. President of Exporters Association of Bangladesh (EAB) Abdus Salam Murshedy said the countrywide political unrest in 2013, Rana Plaza building collapse and fire incidents at Standard Group garments and Tazreen Garment cast an impact on the placement of work orders in the RMG sector from the international buyers which affected to some extent the export growth. Stressing the need for more policy support from the government, the upcoming days for the export-oriented sector, especially for the RMG sector, would be challenging as the international competitors are now in a comfortable position. Besides, due to the rise in cost in safety measures, utility bills and transportation, the competitive edge of the major-export earning RMG sector is gradually decreasing for which there is a need for policy support (Independent, 30 December, 2014).

### 4.3.5 An Overview of Trade Liberalization in Bangladesh

Trade liberalization has been one of the major policy reforms carried out by Bangladesh. It has been implemented as part of the overall economic reform programme, that is, the structural adjustment programme (SAP) that was initiated in 1987 and which formed the component of the "structural adjustment facility" (SAF) and "enhanced structural adjustment facility" (ESAF) of the International Monetary Fund and the World Bank. This adjustment programme put forward a wide range of policy reforms including trade, industrial, monetary, fiscal and exchange rate policies, privatization of state-owned enterprises policy and the promotion of foreign direct investment. After independence in 1971, Bangladesh followed a of a highly restricted trade regime strategy. This was characterized by high tariffs and non-tariff barriers to trade and an overvalued exchange rate system that was supported by the import-substitution industrialization strategy of the Government. This policy was pursued with the objectives of improving the balance of payment position of the country and creating a protected domestic market for manufacturing industries (Bhuyan and Rashid, 1993). The trade regime registered a major shift in the mid-1980s, when a policy of moderate liberalization was initiated. However, in the early 1990s, large-scale liberalization of trade was implemented. Fierce debates are still existed among economists and policy makers on the extent of trade liberalization. The World Bank and the International Monetary Fund have claimed that the pace and extent of liberalization in Bangladesh in the 1990s was not as rapid compared to other developing countries (World Bank, 1999). However, this is not endorsed by economists and private industrial entrepreneurs in Bangladesh, who argue that a much slower pace of liberalization is warranted (Mahmud, 1998). In fact, there have been concerns over whether the impact of trade liberalization has been favourable to the domestic economy. There is also continuing debate over the future direction of trade liberalization in Bangladesh. The success of trade openness depends on country's trade liberalization. With this view, this section assesses trade liberalization in Bangladesh and examines its impact briefly on economic growth in the country.

#### 4.3.5.1 Trade Liberalization Policy in Bangladesh

Bangladesh pursued an import-substituting industrialization strategy in the 1970s, the key objectives of which were:

(a) to safeguard the country's infant industries;

(b) to reduce the balance of payments deficit;

(c) to use scarce foreign exchange efficiently;

(d) to ward off international capital market and exchange rate shocks;

(e) to lessen fiscal imbalance; and

f) to achieve higher economic growth and self-sufficiency.

The basic policy tools used under this policy regime included high import tariffs, quantitative restrictions, foreign exchange rationing and an overvalued exchange rate. However, in the face of the failure of such inward-looking strategies to deliver the desired outcomes, together with rising internal and external imbalances, trade policy reforms were introduced in the early 1980s. Since then, trade liberalization has become an integral part of Bangladesh's trade policy.

Table 4.3.5.1.1 (in Appendix) shows the removal of quantitative restrictions at the 4-digit HS classification level in Bangladesh. Restricted for trade reasons are very high 550 in 1986-87 and the lowest figure is 63 on an average in 2003-06. Restricted for non-trade reasons are in the highest 275 in 1985-86 which is decreased over the year and the figure stands at 5 on an average in 2003-06. The trade restriction was very high at 101 in 1988-89 but it is decreased over the period and remained around 15. The table also clarifies that all restrictions of trade are decreasing as the time passes and the country has been more liberalized and opened.

#### 4.3.5.2 Tariff Regime in Bangladesh

Duty concessions and general exemptions to the applied MFN tariff rates are being provided accordance with Section 20 of Customs Act on a case-by-case basis through gazette notification. At present three types of tariff concessions on these MFN rates are being provided: i) import under different bilateral/ regional trade agreement; ii) imports of capital machinery and spare/parts by registered industrial consumers including export-oriented industries; and iii) import of raw material for a specific use or user (i.e. end use provisions) such as dairy and poultry, pharmaceuticals, leather and textile industries. Bangladesh has been following the Most Favoured Nation (MFN) tariff rate since FY 2000-01 in order to facilitate smooth implementation of the import policy of the government.

Table 4.3.5.2.1 (in Appendix) states the tariff structure in Bangladesh from FY 2000-01 to 2013-14. The number of operative tariffs is high in 2001-02 but with changing time span, the tariff structures are reducing gradually. The maximum tariff rate is high at 37.5

percent in 2001-02 and it stands at 30 percent in 2003-04. After then, the rate is remained same over the period and it stands at 25 percent in 2013-14, whereas, the number of slabs is 5 in the tariff structure in Bangladesh.

**4.3.5.3 Reduction of Tariffs**

The process of reducing import tariff rate in Bangladesh started since FY 1991-92 and is still continuing in FY 2013-14 in order to facilitate the indigenous industries and has been made it consistent with the world-wide tariff rate. The unweighted average import tariff rate in FY 1991-92 was 57.22 % which has been reduced to 14.44 % in FY 2011-12. At present, ad-valorem duty is imposed on 99.50 % tariff line. Specific duties are in existence at different rates on some products such as sugar, cement clicker, bitumen, gold, steel products-scraped ship against only 25 tariff lines. Value added tax, regulatory duty, supplementary duty, advance income tax and advanced trade VAT are imposed on importable goods in addition to customs duty. The slab of supplementary duty was 20 percent, 30 percent, 45 percent, 60 percent, 100 percent, 250 percent, 350 percent and 500 percent in FY 2011-12. The MFN unweighted import average is shown by the Table 4.3.5.3.1 (in Appendix).

Table 4.3.5.3.1 (in Appendix) indicates that there is a drastic reduction in unweighted tariff rates during the 1990s that result a fall in import-weighted tariff rates. Table also shows that the import-weighted average tariff rate declines from 42.1 percent in 1990/91 to 13.8 percent in 1999/2000, and 11.48 percent in 2003/04. The tariff rate rises to 16.53 percent again in 2004-05 and then it declines very slowly at 14.44 percent in the year 2013-14.One important aspect of the tariff structure in Bangladesh is related to the use of import taxes that have a protective impact (also known as para-tariffs) over and above the protection provided by customs duty (World Bank, 2004). These taxes include the infrastructure development surcharge, supplementary duties and regulatory duties.

Table 4.3.5.3.2 (in Appendix) shows the average customs duties and para-tariffs in Bangladesh from 1991-92 to 2003-04 which indicates that some of these para-tariffs, such as the infrastructure development surcharge, are applied across-the-board to all or practically all imports, and can be considered as general or normally applied protective taxes that affect all or nearly all tariff lines. It appears that despite the lowering of customs duties, the presence of para-tariffs did not significantly lower the total protection rate.

Until the mid-1980s, Bangladesh followed a strategy of import-substitution. The regime was also characterized by a high degree of anti-export bias. However, since 1985, export policy reforms have been implemented that have included trade, exchange rate, monetary and fiscal policy incentives aimed at increasing effective assistance to exports. A few sectors, especially ready-made garments, have been among the beneficiaries of these reforms.

#### 4.3.5.4 Phases of Trade Liberalization in Bangladesh

Trade liberalization policies pursued by Bangladesh have passed through three phases. The first phase (1982-86) was undertaken as Bangladesh came under the purview of the policy based lending of the World Bank; the second phase (1987-91) began with the initiation of the three year IMF structural adjustment facility (SAF) in 1986; and finally, the third phase since 1992, was preceded by the IMF sponsored Enhanced Structural Adjustment Facility (ESAF) (BIDS, 2003). These reform measures led to a significant decline in quantitative restrictions, opening up of trade in many restricted items, rationalization and diminution of import tariffs, and liberalization of foreign exchange regime. Bangladesh has, by now, liberalized its economy considerably; during the 1990s, in particular, the pace of liberalization was very rapid. The liberalization measured contributed to reducing policy-induced anti-export bias at a moderate level. Currently, the price incentive structure, as measured by average effective exchange rates, is between 10 percent and 13 percent skewed in favour of (against) the import-competing (export) sector. More liberalization and rationalization of the tariff regime could be another way of further reducing the anti-export bias.

Table 4.3.5.4.1 (in Appendix) clearly shows GDP per capita has been increasing since pre liberalization period and continuing to move at a faster rate up to now. Besides, FDI and remittances show high growth rate in the post liberalization period. Both exports and imports have increased noticeably since liberalization, with imports rising faster than exports in the period immediately after liberalization. However, the inflation rate fell with liberalization, possibly due to availability of cheaper imported goods, and demand management conditionality of the international financial institutions. Yet, by the period 2006-2010, the inflation rate had returned to its pre-liberalization levels. The growth rate of GDP in the post-liberalization period was significantly higher. The availability of imported intermediate and investment goods was a factor in the growth. The post-liberalization period showed a huge jump in FDI. These and other contributory factors lead to a higher GDP growth trajectory after liberalization.

Table 4.3.5.4.2(in Appendix) presents that the remaining trade barriers work against the emergence of new export activities and expansion of the export activities to non-enclave areas. It is no surprise then that the export base is heavily concentrated in garments, the sector facing the most liberal import regime largely because of its access to bonded warehouse facility. RMG exports account for about 75 percent of merchandise exports. Table further shows that the trade openness in Bangladesh was at 43% in 2008.

Recent measures to liberalize the banking and telecommunication sectors are also welcome. Future trade liberalization program needs to focus on (a) reduction in the dispersion and average level of protection, (b) promotion of services export, (c) reduction of the reliance on limited number of goods through diversification of exports, (d) promotion of more efficient handling of custom and border procedures, and (e) a more efficient duty drawback system.

**4.3.6 Present State of Trade Openness in Bangladesh**

Bangladesh, in fact, opened her economy in the late 1980s to reap the benefits of FDI in order to accelerate economic growth. The government set up Board of Investment (BOI) in 1989 to promote and facilitate private investment both from domestic and overseas sources. Bangladesh has significantly opened her economy during the previous two decades from 17.57% in 1986 to 49.09% in 2008 in order to encourage cross- border transactions. The bilateral trade balance for example between the two countries (Bangladesh and Japan) is heavily tilted towards Japan, as Bangladesh imports vehicles, electronic goods and spare parts. On the other hand, Bangladesh mainly exports apparel items, leather and leather goods, and footwear to Japan. In FY2012-13, Bangladesh exported goods worth $750.27 million to Japan, against $600.52 million in the previous year, according to data from Export Promotion Bureau. In 2012-13, Bangladesh imported goods worth $1.19 billion from Japan against $1.45 billion in the previous year, according to BB. At present, more than 180 Japanese companies have operations in Bangladesh. (Daily Star, 24 February, 2015). Trade openness which is measured as the ratio of export plus import to the GDP is going to increase gradually in Bangladesh but the trend is not satisfactory at all. The results are shown by the following Table.

Table 4.3.6.1 (in Appendix) presents the actual trend of trade openness with GDP growth in Bangladesh from 2005 to 2013. Table indicates that the GDP, export and import rise over the period and in 2005, the figures stand at 60277.56, 9994.81 and 13891.43 respectively. In 2013, the figures of GDP, export and import rise to 97261.98, 22905.71 and 26467.89 respectively. The degree of trade openness is also risen from 39.6 in 2005 to 50.8 in 2013. Table further shows that the average exchange rate which is directly related to trade openness also rises from 61.39 in 2005 to 77.74 in 2013.

Table 4.3.6.2 (in Appendix) shows the GDP, export, imports and trade openness in Bangladesh from 1972 to 2013. There is a clear indication that in every case, the volume rises over the period. Trade openness in this circumstance, also rises from 15% in 1973 to 50.8% in 2013 in Bangladesh whereas the degree of trade openness is estimated as the ratio of export-import to the GDP at constant prices in the base year 2005. The table is also depicted through the following graphs.

**Figure 4.3.6.1: Trends of GDP, Exports and Imports Growth in Bangladesh (1972- 2013)**

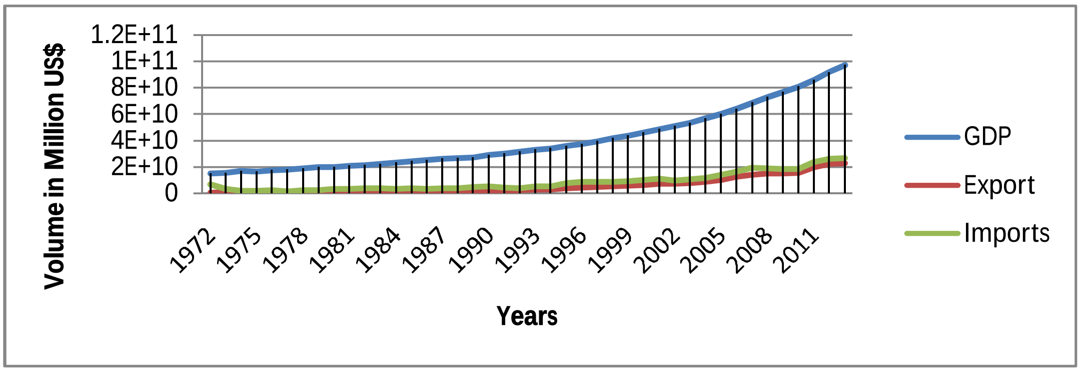
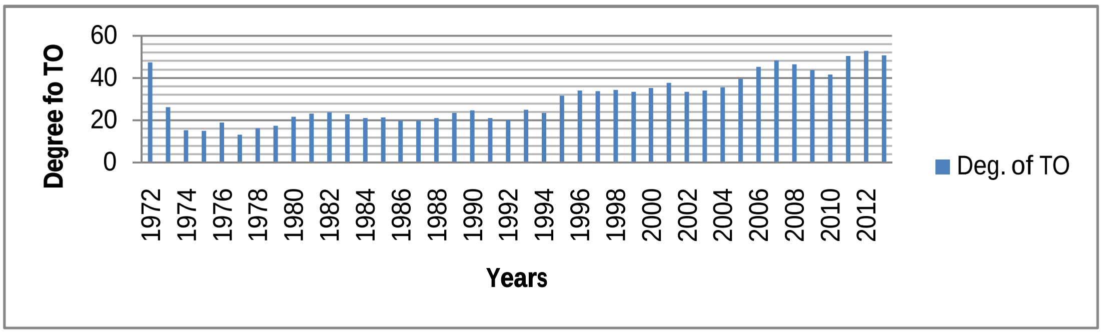



Figure 4.3.6.1 presents the actual scenario of export, import and GDP growth in Bangladesh over the period. Export, import and GDP rise to the rightward over the year. The slopes of the curves have the upward pattern but the change of export and import remains very slow compared to GDP line. Both export and import lines rise upward closely but export curve remains below the import line that indicates export volume in Bangladesh is lower than import. Therefore, there is clearly a negative gap between export and import volume in Bangladesh.

Figure 4.3.6.2 presents the degree of trade openness that is measured by the sum of export and import to the ratio of GDP at constant prices from 1972 to 2013. The trade openness is rising over the period. The degree of trade openness was 26.2 % in 1973 and the figure rises over the period to 50.8% in 2013 in Bangladesh due the establishment of

WTO and globalization. Figure further indicates that the column denoting the degree of trade openness rises with slow fluctuations year by year. Trade openness is thus remarkably rising from the year 1995 and the pace remains almost to 51% in the year 2013.

**Figure 4.3.6.2: Degree of Trade Openness in Bangladesh from 1972 to 2013**




Source: Degree of Trade Openness Is Estimated on the Basis of Table 4.3.7.1

## 4.3.7 Benefits and Cost of Trade Openness in Bangladesh

### 4.3.7.1 Benefits of Trade Openness

Trade can play a vital and multidimensional role for the sake of country's growth and development. Developing countries like Bangladesh has a glorious opportunity to catch up the benefits of international trade. The quantitative analysis undertaken in this section suggests that greater openness has had a favourable effect on economic growth. Both real export and imports have increased with greater openness. The benefits of trade openness in Bangladesh are thus discussed below:

**i) Reorient Factors of Production:** According to the endogenous growth theory, a more open trade regime allows a country to reorient factors of production in sectors that have comparative advantages (Romer 1989). Trade openness in this regard plays a vital role in the better utilization of the abundant factor labour in Bangladesh.

**ii) Technological Progress and Inputs Efficiency:** Solow (1957) reports that trade openness can create a room for technological progress and efficiency in allocating inputs by eliminating protection for import substitution industries which, in turn, influences economic growth in developing countries like Bangladesh.

**iii) Absorbing Capability:** Grossman & Helpman (1991), and Barro & Sala-I-Martin (1995) mention that a country with a higher degree of openness has a greater ability to absorb technological developments generated in the leading nations, and this absorption capability leads them to grow more rapidly than a country with a lower degree of openness. Trade openness thus increases the absorbing capacity of the economy of Bangladesh.

**iv) Imitation Cost of Innovation:** Edwards (1998) argues that if the imitation cost of innovation in the poorer countries becomes lower than the cost of innovation in technologically advanced economies, the poorer countries will grow faster than the advanced one, and there will be a tendency towards convergence. Trade openness thus provides Bangladesh an opportunity to reduce the cost of imitation of technological know how.

**v) Presence of Transaction Cost:** A reduction in the transaction cost provides opportunity for the developing economies like Bangladesh to gain larger access to the international markets, and this helps them to increase foreign exchange reserves through increasing exports.

**vi) Benefit of Product Cycle:** According to the product life cycle theory, a high-income elastic product is usually used as a symbol of fashion and prestige by the upper class people of a developing economy (Vernon, 1966). As products become standardized, firms tend to relocate their production in less capital intensive and low transaction cost economies with a view to exporting them to richer countries. In this case, trade openness offers Bangladesh to take the use of the benefit of product cycle theory.

**vii) Accumulation of Technical and Human Skills:** Obviously, a faster rate of technology absorptions and diffusions helps accumulate technical and human skills that ultimately contribute to growth in the long run. World Bank (1993) studies 51 countries including Bangladesh over a period 1960-89 and concludes that economic openness has a statistically positive impact on the total factor productivity (TFP) growth.

**viii) Enhancement of Economic Growth:** It explains that the economically backward countries can accelerate convergence process to catch richer economies by opening up their capital markets as capital usually moves from capital-abundant towards capital-scarce economies. In effect, economic growth rates are enhanced in the long-run in the developing countries like Bangladesh by trade openness.

**ix) Opportunities for New Investment:** Applying liberalization to capital account too, restrictive measures on foreign capitals are eliminated, offering new investment opportunities to external economic agents. Additional resources may latter finance eventual trade deficits of Bangladesh that can occur from imports operated by foreign subsidiaries located on national territory.

**x) Double Effect:** the labour productivity would increase due to trade openness in Bangladesh, having a double effect. The competitiveness of local firms would improve, determining an increase of the exports that transmit the same effect to income levels.

Finally, the effect of greater openness on the inflation rate in Bangladesh is inconclusive.

#### 4.3.8.2 Costs of Trade Openness

Counter arguments of the positive link between trade openness and economic growth the costs can also be found in the literature that exists in the nature of the economy of Bangladesh. Economic mechanisms don't have just positive externalities in Bangladesh till now. Therefore, economic openness respects the pattern, bringing costs too. Those are as follows:

**i) Macroeconomic Instability:** Rodrik (1992) reports that economic openness may bring macroeconomic instability by increasing inflation, depreciating exchange rates and inviting balance of payment crisis. Historically, Bangladesh is suffering with it macroeconomic instability for long years, trade openness often fuels up the factors of macroeconomics such as inflation, exchange rate, balance of payment, trade deficits and so on.

**ii) Inflation and Exchange Rate:** A high degree of trade openness may increase inflation and lower the real exchange rates which may create negative impact on domestic investment (Levine & Renelt, 1992). Exchange rate is instable for Bangladesh for the foreign demand of Bangladeshi goods. This demand fluctuates with the global recession. This in turn affects the Bangladeshi buyers in the long run.

**iii) Input Supply Reduction:** A liberalized trade regime may lead to a greater exchange rate depreciation which may reduce aggregate supply of inputs by increasing prices of the imported inputs used in the production. As a result, the volume of domestic output tends to be decreased in Bangladesh.

**iv) Doubtful Effect on Economic Growth:** Krugman (1991) argues that the effect of openness on economic growth could be at best, very tenuous and at worst, doubtful. Because, the degree of trade openness, particularly the magnitude of tariff and non-tariff barriers, only can affect the volume of trade, not necessarily the link between exports, imports, and economic growth in Bangladesh.

**v) Trade Measurement Problem:** The conflicting findings basically rest on different measurement of trade openness used by researchers in a cross-country analysis. A country specific data analysis thus deserves attention to capture the impact of specific problems and policies of Bangladesh in order to enrich trade openness with new evidence.

**vi) The Danger of Innovative over Saturation:** The countries which have a significant comparative advantage in international trade face the danger of innovative over saturation. For example Bangladesh has significant comparative advantages in producing and exporting readymade garments. Therefore, it has a challenge to face the danger of innovative over saturation in this regard.

**vii) Reduction of Productivity:** The economic openness of the developing countries might cause productivity reduction in the long term.

**viii) Innovation Pessimism:** Innovations can turn into usual inputs if no investments are made in continuous up-grading, according to market evolutions.

**ix) Treats of External Shocks:** By changing the angle, an increased economic openness may press national government to focus on the protection of the domestic producers confronted with external shocks.

**x) Growth Hampering:** State Subsidies provoke the distortion in resource allocation, hurting the domestic growth of the country like Bangladesh. Beside these, for the situation of membership in a regional trade block, such initiative negatively affects the internal market, blocking the access on certain markets for other companies originated in other member countries.

### 4.3.10 Conclusion

The analysis undertaken in this study suggests that greater openness has a favourable effect on economic growth of Bangladesh. Both real export and imports have increased with greater openness. The effect of greater openness on the inflation rate is inconclusive. Hence, it is observed that liberalization policy certainly improves export of the country which eventually leads higher economic growth after 1990s. Again after the short review of the factors that lead to economic openness, and by balancing some positive and negative consequences of the phenomenon, some conclusions can be drawn as: i) economic openness means more than liberalization via reduced or eliminated tariffs or non-tariff barriers in international trade; and ii) an increased degree of openness can be quantified both through intensive trade relations and competitive contribution on markets that have potentially increasing returns of scale due to their extended dimensions. Hence, there is a clear positive trend in the degree of trade openness in Bangladesh over the year.

# Chapter Five: Data Description of the Issue

## 5. Introduction

The World Bank uses Gross Domestic Product (GDP) to classify country's levels of development. The empirical methodology focuses on testing the impact of domestic investment (proxied by countries gross capital formation), foreign direct investment (FDI), trade openness (measured by the summation of exports and import dividing by the GDP) as well as examines the short and long run causal relationship among these variables with their different components at the disaggregated level in Bangladesh over the period 1972 to 2013. Econometric analysis and the results depend on the availability of appropriate data. This chapter thus describes the nature, sources, and trends of data on domestic investment, FDI, and trade openness with their different dimensions as well as economic growth of Bangladesh using suitable tables and graphs. The comparative analysis of the variables in South Asian regions have also been described briefly throughout this chapter. Data of this study have basically been collected from the World Development Indicators, Bangladesh Economic Reviews, Bangladesh Bureau of Statistics (BBS), Statistical Yearbooks of Bangladesh and various budgetary documents. The data for real terms have been transformed according to the theoretical indications. The data of the variables have been discussed in the world wide perspective specially South Asian Regions and in the Bangladesh perspectives throughout this chapter.

## 5.1 An Economic Overview of South Asian Regions

### 5.1.1 Economic Growth in South Asian Regions

South Asia belongs to eight countries of the world, such as; Bangladesh, India, Pakistan, Srilanka, Nepal, Bhutan, Maldives and Afghanistan. Each of the countries has their various dimensional trend and characteristics. For this rationality, the successive economic trends of economy of the South Asian regions are: India, the region's largest economy, experienced a sharp slowdown in 2012 and 2013, when growth dropped below 5 percent, driven in particular by weak industrial output. Following this, the Indian economy grew slightly faster in 2014, reaching 5.4 percent, reflecting an improvement in the growth rate of the service sectors and a better monsoon than originally forecast. Bangladesh and Sri Lanka have been able to maintain robust economic growth rates in recent years. In case of Bangladesh, the economy has grown at around 6 percent for an extended period due to the strong growth in exports (driven by the garment industry) and consumption (fuelled by remittance inflows). The Sri Lankan economy has performed even better, with the GDP growth rate estimated at 7 percent in 2014, on the heels of strong domestic demand and a rise in exports and tourism. The economies of Nepal and Pakistan have consistently grown below the regional average, with the former suffering in recent years from political tensions and the latter having been hit by insecurity, political uncertainty and weak macroeconomic fundamentals. Growth in Afghanistan and the Maldives is also slowed in 2014.

Table 5.1.1 (in Appendix) discusses the comparative scenario of the country wise GDP growth (actual and projected) in percentages. It shows that growth rate of GDP in both actual and projected in Bangladesh is lower than many other developing countries of the world. It is eventually, less than that of the developing Asian countries. In 2008, the GDP growth in Bangladesh was 6.0 percent and the projected figure would be 6.2 % in 2015. On the other hand, the GDP growth rate in actual and projected figure was 7.9 in 2008 and it would be 8.5 in 2015 respectively in other Asian developing countries. The growth rate of Bangladesh is also lower than that of India and Vietnam.

### 5.1.2 Foreign Direct Investment in South Asian Regions

Like other developing regions, South Asia faces uncertainty stemming from spillover effects of monetary policy in advanced economies and energy price disruptions. India, whose economy remains the main destination for foreign direct and institutional investment flows in this region, was particularly affected in 2013. During the country's fiscal year 2013-14, foreign direct investment inflows reached US$36.0 billion and net foreign institutional investment (FII) flows in just the first three months of the same fiscal year amounted to US$12.5 billion. Thereafter, there was a swift reversal of FII flows: between June and August 2013, net FII outflows amounted to US$15.4 billion, before short-term capital flows stabilized and returned by the end of 2013 due to measures taken by the Reserve Bank of India.

### 5.1.3 Unemployment Scenario in South Asian Regions

South Asia faces a serious challenge of jobless growth, as average annual economic growth of 6.1 percent from 2009 to 2014 corresponded to employment expansion of only 1.4 percent per year for the same period (Table 5.1.3.1). Moreover, much of the employment growth that occurred was in vulnerable and informal employment (IILS, 2013). For instance, vulnerable employment accounted for over three-quarters of all employment in 2014, with many of those in vulnerable employment working in subsistence agriculture and likely to be among the working poor.

Table 5.1.3.1 (in Appendix) states that the unemployment rate is relatively low in South Asia, at 3.9 percent in 2014 -lower than in all other regions but this fails to reflect the quality of jobs. The share of those in employment who live below PPP US$1.25 per day (the international extreme poverty threshold) is estimated at 19.3 percent in Sri Lanka. There has been significant cross-country variation in employment in the manufacturing sector from just 6.6 percent in Nepal to 18.5 percent in 2014 – equivalent to 124 million people.

### 5.1.4 Structural Transformation in South Asian Regions

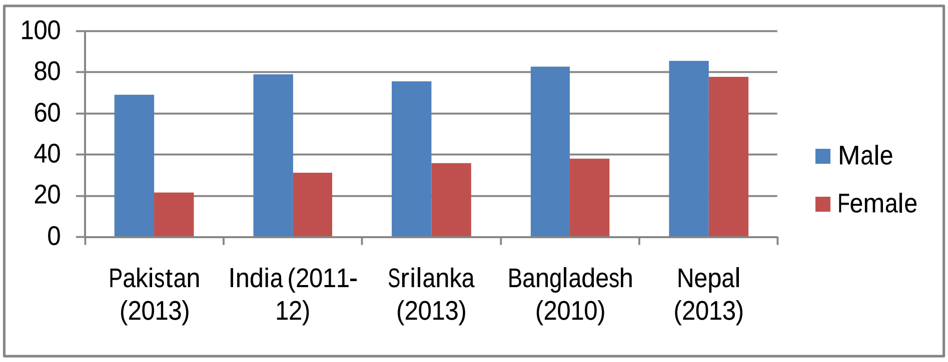
The process of structural transformation remains unfinished in South Asia. In 2014, agriculture accounted for 46.8 percent of all employment in the region, compared with the global average of 29.1 percent while the share in agriculture has been declining, from 52.2 percent in 2008, there is a scarcity of quality opportunities for those leaving rural areas and for the large number of young people entering the labour market. An additional 2.1 million youth will enter the labour force over the next five years, potentially aggravating already high youth unemployment, which is 4 times higher than that for adults (Table 5.1.3.1 in Appendix).

### 5.1.5 Gender Disparities in South Asian Regions

The majority of women in South Asia are still heavily dependent on agriculture at 62.0 percent in 2014, compared with 42.1 percent for men. Most South Asian countries face a challenge of low labour force participation for women, with the exception of Nepal showed in the following figure. Typically, low female participation in South Asia has been attributed to social norms associated with women burdened with household duties as well as relatively lower levels of female education.

Figure 5.1.5.1 indicating the same is true at the US$ 2-a-day level (PPP), which accounts for over half of the employed population (54.4 per cent in 2014), equivalent to 350 million people. Nonetheless, over the past decade, many countries in the region have also been able to reduce the extent of extreme poverty. This owes largely to the anti-poverty focus adopted in national development plans by countries including India, Bangladesh and Nepal, such as the rural employment guarantee in India and enhanced access to finance for the poor.

**Figure 5.1.5.1: Gender Differences in Labour Force Participation Rates** (Percentages)

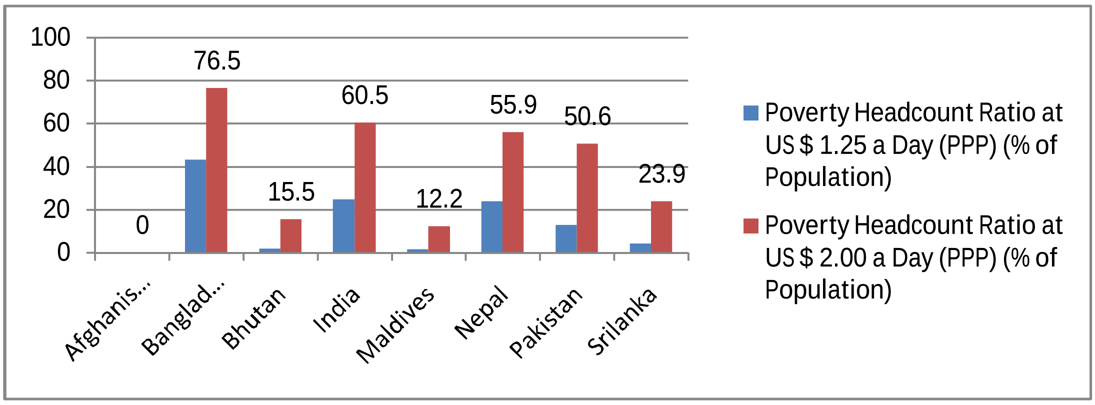



Source: ILO Labour Survey Report, 2014.

### 5.1.6 Poverty Scenario in South Asian Regions

The focusing on per capita GDP and GNI alone to deduce standard of living will not be correct. An analysis of the overall improvement in standard of living should also take into account measures such as Poverty Incidence, Human Development Index (HDI), Human Poverty Index (HPI), and the Gini Coefficient. Almost 50% of Bangladeshi are poor (earning less than $2 a day), and 30% extremely poor (earning less than $1.25 a day). In the past decade real GDP grew by 60 percent, translated into average GDP growth of 3 percent per capita. This growth in GDP was accompanied by a modest 9 percent decrease in the incidence of poverty. Although this improvement is heartening, the overall poverty incidence still remains very high at 50 percent.

**Figure 5.1.6.1: Poverty Headcount Ratio and Inequality in Selected Countries**




Source: World Bank Poverty and Equity Databank and Povcal Net (World Employment and Social Outlook 2015).

Figure 5.1.6.1 presents that the countries show the highest levels of income inequality in the region, which has remained relatively persistent over the past decade. This suggests that poverty alleviation does not automatically translate into a more equal distribution of the benefits of economic growth. The share of people living on less than US$2 a day (PPP) remains extremely high, at 60 percent in India (2012) and over 50 percent in Pakistan (2011) and Nepal (2010). The situation is even more dramatic in Bangladesh, where three out of four people lived on less than US$2 a day (PPP) in 2010. Declines of a similar magnitude have been observed in India and Pakistan, where the share was 24.7 percent and 12.7 percent respectively, in 2011. Bhutan, Maldives and Sri Lanka have almost eradicated extreme poverty during the past decade.

## 5.2 An Overview of Economic Growth in Bangladesh

### 5.2.1 Structural Change in the Economy

The structural changes of the share of broad sectors in GDP are represented in the Table 5.2.1.1. Over the three decades the share of the industry sector in GDP increased gradually and continued to increase in FY 2013-14. On the other hand, the service sector contributed at a similar pace over the period. Bangladesh has been able to achieve GDP growth at more than 6 percent on an average recently even during the period of global financial crisis. According to the final estimate of Bangladesh Bureau of Statistics, GDP growth stood at 6.71 percent in FY 2011-12 which was higher than 6.07 percent in FY 2010-11. The economy recorded 7.5 percent GDP growth rate in the current fiscal year 2014-15 as per the provisional estimate. In attaining GDP growth, three main sectors of the economy like agriculture, industry and service sector made major contributions. Because, in FY 2011-12 at constant prices share of agriculture, industry and service sectors stood at 19.29 percent, 31.26 percent and 49.45 percent respectively (BER, 2014).

The growth in GDP has been accompanied by an increasing trend in per capita GDP and GNI growth. In FY2004-05, per capita income has been $470, which is 9.66 percent higher than that of the previous fiscal year. During the same period, per capita GDP had increased by 9.22 percent. The table below illustrates the trends in GDP, GNI, per capita GDP, GDP growth rate and GNI.

Table 5.2.1.1(in Appendix) shows that the provisional value of GDP at market prices stands at Tk. 9,14,784 crore in FY 2011-12, which was 14.82 percent higher than that of the previous year. At current prices, the estimated per capita GDP for the FY 2011-12 is Tk. 60,350 which has increased by 13.35 percent from the per capita GDP of Tk. 53,238 in FY 2010-11. On the other hand, per capita national income stood at Tk. 66,283 in 2011-12 which was Tk. 58,083 a year earlier. In US dollar, per capita GNI and GDP stood at US$ 848 and US$ 772 respectively during this year, compared to UA$ 816 and US$ 748 respectively in FY 2010-11. The per capita GDP and GNI are freshly increased to 83731 and 92510 Tk. in 2013-14 fiscal year. The growth rate of GDP stands to 6.12 percent where as it was 6.52 percent in 2011-12.

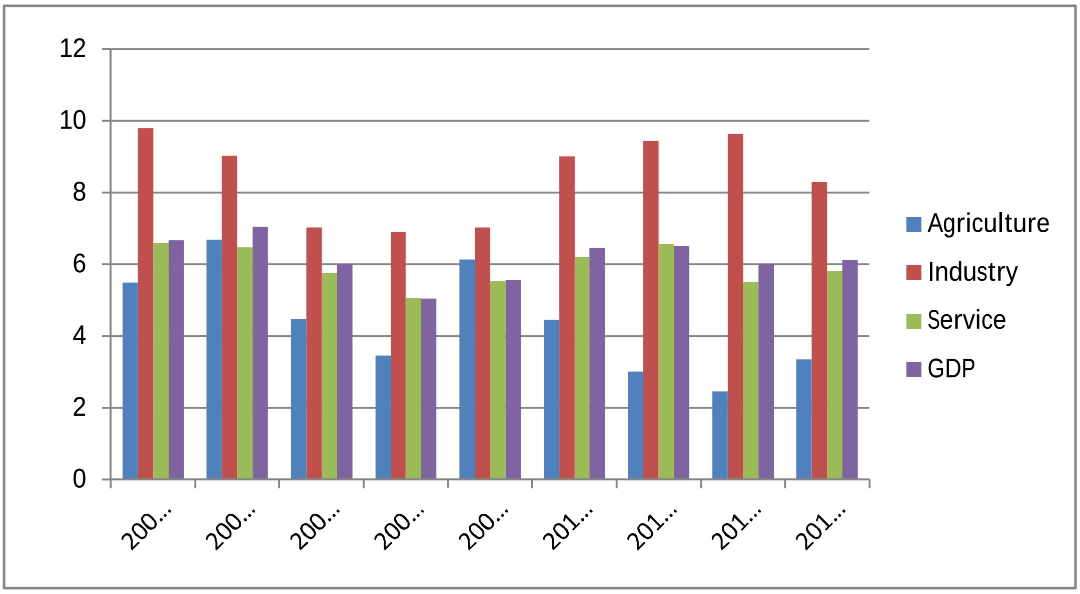
Table 5.2.1.2 (in Appendix) indicates the trend of structural transformation of broad sectoral shares in GDP and growth rate at constant prices over the period in Bangladesh. The growth rate of agriculture sector to the GDP in Bangladesh was 33.07 percent in 1980-81. This figure has been declined over the period and stands at 16.34 percent in 2013-14. The industrial contribution to the GDP of Bangladesh was 17.31 percent in 1980-81; freshly increasing this figure stands at 29.61 percent in 2013-14. The trends in the service sector are remained near about 50 percent over the time and the figures are 49.62 and 54.05 percent in 1980-81 and 2013-14 respectively. The growth pattern of agriculture sector remains the same steadily towards 3.5 percent but the growth rate in the industrial sector is increased from 5.13 percent in 1980-81 to 8.39 percent in 2013-14.According to the provisional estimate, on expenditure side, in FY 2011-12 consumption expenditure decreased by 0.09 percentage point of GDP to 80.63 percent of GDP compared to 80.71 percent in FY 2010-11. On the contrary, domestic savings accelerated to 19.37 percent of GDP in the fiscal year 2011-12 from 19.29 percent of GDP in FY 2010-11. However, because of positive growth in remittance inflows, national savings increased to 29.40 percent of GDP in FY 2011-12 from 28.78 percent of GDP a year earlier. Furthermore, investment-GDP ratio stood at 25.45 percent in the fiscal year which was 25.15 percent in FY 2010-11.

Table 5.2.1.3 (in Appendix) states that on the expenditure side, consumption accounted for 80.63 percent of GDP in the fiscal year 2011-12 which was decreased by 0.08 percent compare to that of the previous year. The economy of Bangladesh seems to have stabilized because it is experiencing a steady growth in GDP in recent years. It can be seen from the table that Bangladesh’s GDP growth has remained around 4.00 to 6.5 percent. Table further shows that consumption and investment expenditures in private sector are increased many folds than public sector but the net export is always negative in Bangladesh.

### 5.2.2 Sector Wise Share to GDP

Industry sector is contributing more to the GDP of Bangladesh economy. Like other developing countries, service sector is increasing here in a rapid rate as a result of providing assistance to the growing industry sector. On the other hand, the contribution of agriculture to GDP growth is dwindling gradually. Despite the large production increases that were registered by the sector, agriculture's year-on-year growth rate was lower due to the high base for comparison following robust growth during successive recent years. In FY2004-05, the rate of growth of the agriculture sector has been -0.73%, down from 4.38% in FY2003-04. This sharp decline was mainly due to the devastating floods at the middle of the year 2004.

**Figure 5.2.2.1: Sector Wise Growth Rate in Bangladesh as Percentage Change**



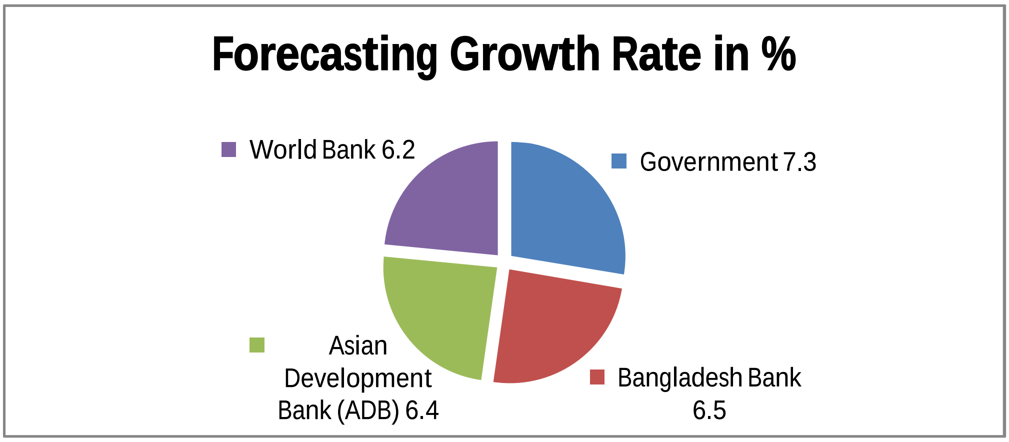

Source: Bangladesh Economic Review, 2014.

Figure 5.2.2.1 illustrates the trends in sectoral share of GDP from FY 2005-06 to FY2013-14. There is a clear steady upward growth trend of the industry sector while the downward growth trend is observed in the agricultural sector to GDP growth in Bangladesh. Growth of the service sector remains to near about 5.5 percent while GDP growth rate at the constant prices remains to near about 6.00 percent over the periods in Bangladesh.

### 5.2.3 Growth Forecasting in Bangladesh: A World Bank Report

The growth forecast is based on the assumption of continued political stability, as witnessed throughout 2014, the multilateral lender said in the latest edition of its Global Economic Prospects report released worldwide. But the return of political instability on the first day of 2015 has "watered down" the prospects. Non-stop blockades mixed with local and nationwide hartals have badly hit farm incomes, disrupted inter-district road and rail transport, weakened buyers' confidence on the exporters' ability to deliver on time and halted the rebuilding of investor and consumer confidence.  Consequently, achieving the projected growth may be very challenging.

**Figure 5.2.3.1: Forecasting Potential Crowth Rate in Bangladesh in 2014-15**




Source: The Daily Star Business Report, January 2015.

Figure 5.2.3.1 states that the World Bank (2015) has forecasted 6.2 percent economic growth in the fiscal year 2014-15, up from last year's 6.1 percent, supported by continued robust remittances and recovery in private consumption. But the outlook is way below the government's target of 7.3 percent for the same fiscal year. Bangladesh Bank has forecasted 5.5 percent of GDP growth rate while ADB has forecasted 6.4 percent in the fiscal year 2014-15 potentially in Bangladesh. Exports started badly in the first quarter, but showed encouraging signs of recovery in the second quarter. Private investment, which was stagnant the past three years, also appeared to be regaining some momentum, as witnessed by rising private sector credit growth towards the end of 2014, the WB economist said. Sustained remittance inflow in 2014, which is a sizeable share of GDP, helped offset large trade deficits, the report said. However, weak bank balance sheets continue to impede financing for an upturn the investment cycle, WB said. Banking system reforms particularly aimed at strengthening human resources, improving nonperforming loan management and raising capital ratios, would help to improve financial intermediation.

### 5.2.4 Inflation and Price Level Changes in Bangladesh

To analyze the trend in price level change in Bangladesh, four distinct periods of 1991-1996, 1996-2001, 2001-2006 and 2006-2014 have been considered. In 1991, the government established accountability in all aspects and forced bank defaulters to repay loans. Due to pressures from IMF and World Bank to establish a free market, the government started to take a liberal attitude towards the market. An open market economy was established and this had a major influence on inflation. Due to trade liberalization, import became cheaper compared to price level of consumer goods. In 1993, Bangladesh had a bumper ‘aman’ crop. This reduced the import of food grains, and the price of staple food declined. Since agri products have a greater weight age in the calculation of Consumer Price Index (CPI), decline in the price of food grains caused a reduction in inflation.

During 1993 and 1994, production in mills and factories increased uninterruptedly due to political stability. By the end of 1994, the rate of inflation was at 4%. Instability in the political arena began from 1995. As a result, prices of commodities went up, and by the middle of 1996 the rate of inflation had increased significantly up to 2.52%. In the years 1999 and 2000, the country experienced good production, which resulted in inflation to dip below 5% in 2004. But the ill-fated event of 11th September 2001 completely changed the economic scenario. The USA and the rest of the developed world fell into recession. This caused exports to fall and the economy was dealt a severe blow. By the year 2003-2004, the rate of inflation rose to around 5 percent. The economy grew by 6%, but it caused inflation to rise at a faster rate. In later years, the volume of imports rose, driving the value of the local currency down. Consequently, the price of imported raw materials rose up, that rises to another round of inflation. In 2006, to ease pressure on fiscal and external balances, the government took a number of measures like increasing interest rate, controlling import and caused slowdown of economy. The government also took measures to raise tax revenues by charging indirect taxes in the form of VAT. All these meant even higher inflation rates.

Table 5.2.4.1 (in Appendix) expresses that according to the Consumer Price Index, inflation rate in national level stands at 6.78 percent in 2011-12 which was 8.69 percent in the previous financial year. Table further shows that inflation rate in national level reaches to the highest peak at 12.30 in 2007-08 but the figure comes down at 6.78 percent in 2012-13. This time food inflation rate (5.22) is much lower than that of non-food inflation rate (9.17) in the country. It is a matter of fact that inflation rate in national level has been remaining below two digits in Bangladesh for several years.

Table 5.2.4.2 (in Appendix) shows the inflation rate at national level year by year in Bangladesh. In 1987, the rate of inflation was 9.87 percent which was higher than the rate of the next few years. In 1995, the inflation rate stands at the peak stage of 10.30 in the national level due to the impact of globalization as well as the political unrest in the country. The inflation rate is the highest level 10.70 percent in 2011. After that the rate is decreased in Bangladesh at 7.53 percent in 2013.

### 5.2.5 Trade Openness and Inflation in Bangladesh

Theoretically, there is negative relationship between trade openness and inflation rate in the country that is, inflation rate is declined as trade openness is increased and the vice-versa. Following Table illustrates this relationship of trade openness and inflation in Bangladesh. Table 5.2.5.1 presents the degree of trade openness, exchange rate, current account balance and inflation in Bangladesh from 2005 to 2013. The degree of trade openness stands at the peak 52.9 in 2012 and falls a bit at 50.8 in 2013. County's current account balance stands to 2,525 in 2013 from the negative balance of -557 in 2005. Inflation rate goes to the double digits 10.71 percent in 2011 and it falls again at 7.53percent in 2013.

### 5.2.6 Employment in Bangladesh

Labor market situation in Bangladesh is fragile as high population growth continues to expand the economically active population and privatized industries simultaneously lay off employees. Relatively high rates of inflation combined with high levels of unemployment may lower real wages. According to Bangladesh Labor Force Survey 2002-03 conducted by BBS, a labor force (above 15 years) of 4.43 crores (male 3.45 crores and female 0.98 crores) is engaged in a variety of professions. Agriculture accounts for 51.69% of employment; industry 13.56% and services 26%. It is observed that highest 44.70% labor force is engaged in self-employment, 20.09 % of labor force was engaged as daily laborers and 13.77% as full time employed workers. 18.28% of labor force was engaged as unpaid family laborers. Labour Force Survey 2010 is published by the Bangladesh Bureau of Statistics. According to this survey, economically active population of age 15 years and above in Bangladesh is 5.67 crores of which 5.41 crores (Male 3.79 and Female 1.62 crores) are engaged in different professions. In the Labour Force Survey 2005-06 economically active population (15 + age) was 4.74 crores (Male 3.61 and Female 1.13 crores).

Table 5.2.6.1 (in Appendix) presents that major portion of labour force is engaged in the agriculture sector in Bangladesh. Though the share of labour force in agriculture is reduced in LFS 2010 in compare to the Labour Force Survey 2005-06 (48.10), it is still now the highest sector of employment in Bangladesh (47.50 percent). The share of labour force is decreased by 0.6 percent in agriculture within the two surveying period of 2010 and 2005-06. In manufacturing sector, the labour force engagement is increasing over the year but increasing rate is very slow and it stands at 12.34 percent in 2010 whereas it was 10.97 percent in 2005-06. Table also shows that labour force in trade and hotel restaurants are fluctuated over the year and the share is 15.53 in 2010 whereas, it was 17.24 in 1995-96. Finally, the table expresses that labour are being migrated from agriculture to other professions over the years.

Table 5.2.6.2 (in Appendix) indicates that some 40 lakh new faces entered the job market between 2010 and 2013 and an equal number of people got jobs thanks to increasing economic activities in non-farm sectors, according to the Labour Force Survey 2013. At the end of 2013, the total labour force stood at 6.07 crore, up from 5.67 crore recorded three years ago, Bangladesh Bureau of Statistics found in the survey. Of them, 5.81 crore were gainfully employed in contrast to 5.41 crore in 2010. It means 13.33 lakh people entered the market every year during the period under study and an equal number of people got gainfully employed then. Subsequently, the number of absolutely jobless persons remained unchanged at 26 lakh in 2013, according to the survey. The unemployment rate fell at 4.3 percent in 2013 from 4.5 percent in 2010.

Meanwhile, the latest findings of BBS show that a fewer number of people entered the labour market between 2010 and 2013 than between 2005-06 and 2010; then, some 72 lakh people signed up and 67 lakh got jobs in various sectors of the economy. The labour force participation rate stood at 57.1 percent in 2013 against 59.3 percent in 2010. Another factor is the slower rate of job creation, which in turn, is due to the growth of less labour intensive sectors. Between 2010 and 2013, the non-agriculture sectors such industry, trade and other services absorbed a higher number of people than the farming sector. As a result, the proportion of jobs in the agriculture sector, which was the main provider of employment before, declined to 45.1 percent in 2013, from 47.3 percent recorded three years back. However, the rate of entry of women into the labour force slowed down during the period. Only 10 lakh women entered the job market, down from 51 lakh between 2005 and 2010. Of the female entrants, six lakh got jobs. The rest are unemployed, with the rate of female unemployment rising to 7.2 percent in 2013 from 5.8 percent three years back. Women's participation rate in labour force also declined (*Byron and Parvez, Report Published in the Daily Star, March 2015*). It is remarkable that the farm and non-farm employment is widened in the country with the passage of time. One thing should be clear that being an individual sector, agriculture till now is playing a vital role as the main source of employment in Bangladesh.

Table 5.2.6.3 (in Appendix) explains the total population of the country and the economically active population in Bangladesh from the year 1972 to 2013. In 1972, the population was 6,87,30,070 while the economically active population (age group 15-64 years) was 51.84 % of total population which indicates that about half of the total population was inactive or dependent. With the passage of time, the scenario has been changed as the active population is increased with the increasing of total population in Bangladesh. In 2013, the total population increases to 15,65,94,962 whereas, the economically active population also rises to 65.22 % of total population that indicates a positive sign in this area of labour force because economically active population are often considered as the proxy of country's gross labour force.

Table 5.2.6.4 (in Appendix) describes the total labour force, female and unemployment (% of total) in Bangladesh from 1990 to 2013. It shows that the labour force in Bangladesh is increased with increasing population but it is a matter of happiness female participation in labour force is also increased by many folds in the country. It is however, massive challenge for Bangladesh to find work for over 2 million people who enter the labor force every year. Most of them engage in self-employment in low productive areas of the non-formal sector.

### 5.2.7 Wage Rate in Bangladesh

Bangladesh Bureau of Statistics makes Wage Rate Index (WRI) every year in Bangladesh on the base year 1969-70 but it is in the way of processing to make wage rate index on the base of 2010-11.Table 5.2.7.1 (in Appendix) indicates that the nominal wage rate indexes are increased for the fiscal year 2004-05 to 2008-09. The index is decreased by 10.64 percent in 2009-10 compare to the previous year. It is further continuously upward rising trend from FY 2010-11 to FY 2012-13. Table further shows that WRI is increased by 14.73 percent in 2012-13 while it was 11.89 percent in the previous fiscal year. The sectoral growth of WRI is increased in all sectors except manufacturing over 16.08 percent in 2012-13 of which fishery and manufacturing WRI are increased by 16.08 and 10.48 percent respectively. On the other hand, the WRI in agriculture and construction sectors are 21.44 and 16.73 percent in 2012-13 respectively.

### 5.2.8 Overseas Employment and the Remittances in Bangladesh

The overseas employment and the remittances are contributing to the accelerating the economic growth and increasing the stock of foreign exchange reserve of the country. About 4.41 lakhs labours of Bangladesh have migrated for the overseas employment in 2013-14.

Table 5.2.8.1 (in Appendix) presents that the remittances from abroad are shown a decreasing pattern in recent years. The number of overseas labour was 251 thousand in 2002-03 and their remittance stood at 3061.97 US $. There is a drastic increase in the overseas labour (9, 81,000) in the year 2007-08 and the remittance stands at US$ 7914.78 whereas the change is 32.39 percent than that of the previous year. But the number of overseas population is growing very slowly and their remittance is also increasing with very slow/ decreasing rate. In the year 2013-14, it has reached to the lowest figure at US$ 9206.12 with negative percentage changes (-6.93) as well as the number of overseas population is only 2,64,000 while it was 4,41,000 in 2012-13. It has become due to the closing up of the overseas labour market in the Middle East countries especially in Saudi Arabia.

### 5.2.9 Human Resource Development in Bangladesh

Bangladesh has made significant achievements in the areas of education and health in the past thirty years, but many challenges remain because certain other elements for a strong capital base are missing. School enrollment rates have increased but these ratios are lower than those in any comparator countries of East and South Asia. Table 5.2.9.1 (in Appendix) presents the actual position of human capital for Bangladesh in present years. It shows that HDI is increasing gradually at the same time population under poverty line is decreasing. Both fertility and mortality rate are decreasing over the year. Life expectancy of the citizen goes up from 56.9 in 1980 to 66.9 in 2010. Table also shows that student enrolment in each sector as well as adult literacy rate is increasing in Bangladesh over the year. But, tertiary enrolment remains low at about 7 percent, compared to 13.5 percent in India, 18 percent in Indonesia, 22 percent in China, and 30 percent in Malaysia (UNDP, 2010). There are fewer scientists and engineers than in many other developing countries. Bangladesh has a low record of the technological innovation. The country spends less on research and development (R&D) as a share of GDP than do most other developing countries in East and South Asia. While R&D spending by Bangladesh is less than one-sixth of 1 percent of GDP, it amounts to 0.2% in Sri Lanka and Thailand, 0.6% in

Malaysia, 0.7% in Pakistan, 0.8% in India, and 1.5% in China (UNDP, 2010). The shortage of skilled workers is also a cause of concern. Adult illiteracy, despite improvements, remains high. And concerns about the quality of education are also remained.

### 5.2.10 Savings Trend in Bangladesh

Two measures are used to illustrate the saving pattern in Bangladesh: *gross domestic savings* and *gross national savings*. Gross national savings is equal to gross domestic savings (gross domestic product minus total consumption) plus net income and net current transfers from abroad. The table below illustrates the trends in changes in savings from 1972 to 2013.

Table 5.2.10.1 (in Appendix) describes that Bangladesh's savings rate has experienced a steady and substantial rise over the past decade. Bangladesh's gross domestic savings has increased from 2.05 % of GDP in 1980 to 21.17 % of GDP in 2013. Bangladesh's gross domestic savings has increased from 18.38 % of GDP in 2002 to 21.17 % of GDP in 2013, which amounts to an average annual growth of 19.5 %. This steady growth in savings has been a result of rising interest rates and the government's increased borrowing from non-bank sources in the form of saving certificate.

Table 5.2.10.2 (in Appendix) presents the actual scenario of national and domestic savings rate to the GDP in Bangladesh. The national savings rate in Bangladesh was 27.67 % of GDP in 2005-06 and it rises to 30.54% of GDP in 2013-14. As GDP increases the savings rate is also increased over the time but the increasing rate is very slow. Again, domestic savings rate in Bangladesh was 20.25 % of GDP in 2005-06 and it rises to 23.43 % of GDP in 2013-14. The private savings rate in Bangladesh is remained steady at 18% over the period against the public savings (average 1.35 %). These are the poor scenario of the domestic and national savings in Bangladesh. However, low level of savings or dissavings in the public sector caused the saving rate to be low compared to other countries of comparable per capita income.

### 5.2.11 Domestic Capital Formation in Bangladesh

All investment ultimately must be financed by saving by either domestic entities (e.g., firms, the government, households) or foreigners. Therefore, the importance of capital formation of a country is inevitable for the domestic investment which may be the engine of economic growth. Table 5.2.11.1 (in Appendix) clearly indicates the actual scenario of the gross capital formation in Bangladesh from the very beginning of the independence of

Bangladesh. It shows that the gross capital formation in Bangladesh was only US$ 295.40 million in 1972 but with the passage of time the figure stands at 42581.72 million US$ in 2013. In 1990, the gross capital formation was 5138.198 million US$; this was the rising point and the tendency is seen to date in Bangladesh. But, it is a matter of fact that the rate of gross capital formation in Bangladesh is very poor to enhance domestic investment.

## 5.3 Data Description of Domestic Investment

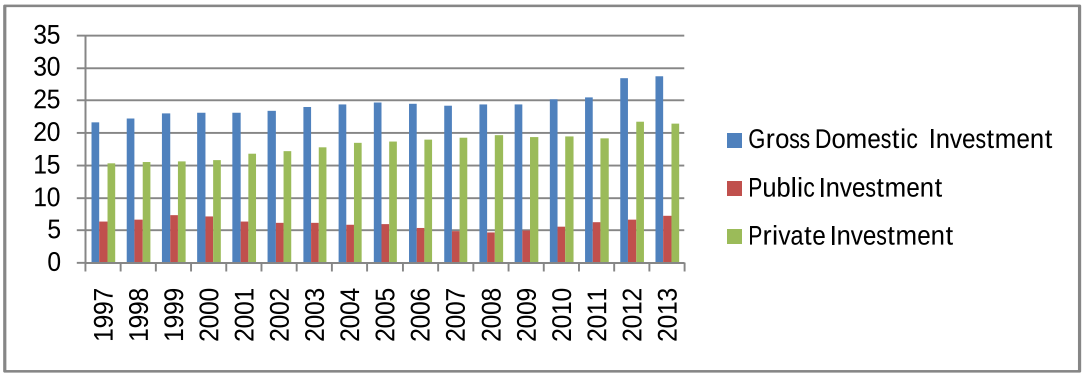
### 5.3.1 Investment Trend in Bangladesh

A deeper analysis shows that public sector investment is much smaller compared to private sector investment and it is growing very slowly. The bulk of investment actually comes from the private sector, a phenomenon common in economies moving toward trade liberalization. The slow growth of public sector investment is rooted in the efforts of the privatization commission, which seeks to privatize loss making government concerns. IMF and World Bank also enforced privatization through their terms and conditions for loan. Table below shows the gross private and public investment as a percentage of GDP in Bangladesh.

Table 5.3.1.1 (in Appendix) states that the gross investment was 21.6 % of GDP in the year 1997 while the figure rose to 24.4% in the year 2004. The gross investment further increased continuously in Bangladesh over the period and stands at 28.69 % of GDP in the year 2013. The gross investment-GDP ratio stagnated around 23% because of the disastrous floods in 1998. This caused immense loss for the economy due to loss of valuable assets and lead to stagnating investment. On the other hand, public investment figure actually declined as percentage of GDP. This percentage figure was 6.4% of GDP in the year 1997, while it fell to 5.9 % in the year 2004 and it is increased little to 7.30 % of GDP in 2013. The private investment in Bangladesh is increased over the period but the rate of growth is very slow and the figure stands at 21.39 % in 2013. It should be noted that the level of investment (public and private) in the economy of Bangladesh is poor compare to other economies of comparable per capita income. A developing economy like Bangladesh needs to plough back more than 40 % of the GDP for investing.

Figure 5.3.1.1 presents the domestic public and private investment with gross domestic investment in Bangladesh (Percentages of GDP) from 1997-98 to 2013-14. Figure shows that gross domestic investment increases over the periods but there is the increasing gap between private and public investment in Bangladesh. Between the fiscal years 2003-2004 to 2004-2005, the rise of private investment was not high enough. This was because during this time, rate of interest was increased to curb inflation. Therefore, higher interest slowed down the overall rise in the level of investment. Another key issue is that the rate of public investment is low compared to the rate of private investment which indicates that there is insufficient capitalization of savings and domestic credit availability in the public sector. The gap between private and public investment is a result of increased government non productive expenditures.

**Figure 5.3.1.1: Domestic / Local Investment in Bangladesh (as Percentages of GDP)**




Source: Bangladesh Economic Review, 2014

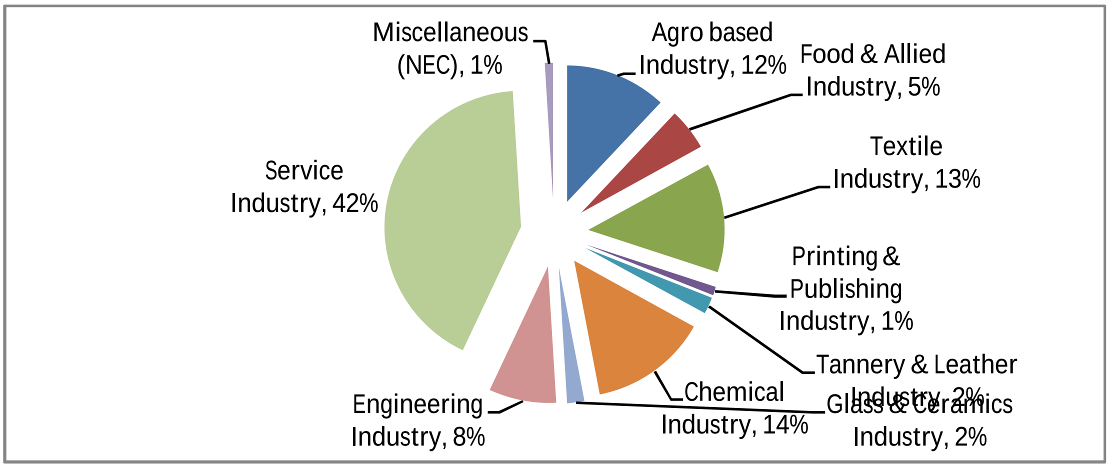
### 5.3.2 Actual Local and Foreign Investment in Bangladesh

There is no organizational statistics to identify the actual status of the Board of Investment-registered local projects. However, by a sample survey conducted by BOI, it is observed that 68 percent of the registered local investment proposals were either implemented or at the varying stages of implementation. Table 5.3.2.1 (in Appendix) presents annual statistics on the projects registered with Board of Investment since FY 2001-02. It would appear from the table that in the FY 2001-02, a total of 2,964 projects involving Tk. 1, 05,400 million were registered with BOI. After a decade in FY 2011-12 with 1,955 projects the proposed investment has increased to Tk. 8, 78,932 million.

#### 5.3.2.1 Sector Wise Local Investment Distribution in Bangladesh

The agro base industry, textile, chemical and service industries are the major investing sectors locally of which service sector is the highest investing area (Tk. 116714.1 million) in Bangladesh in 2013-14. Investment in textile, chemical and agro base industries are declining in recent years but investment in services and other sectors are increasing in Bangladesh, due to political unrest and for some other reasons.

**Figure 5.3.2.1.1: Sector Wise Local Investment Projects Registered with BOI (in %)**




Source: Board of Investment of Bangladesh (Bangladesh Economic Review, 2012)

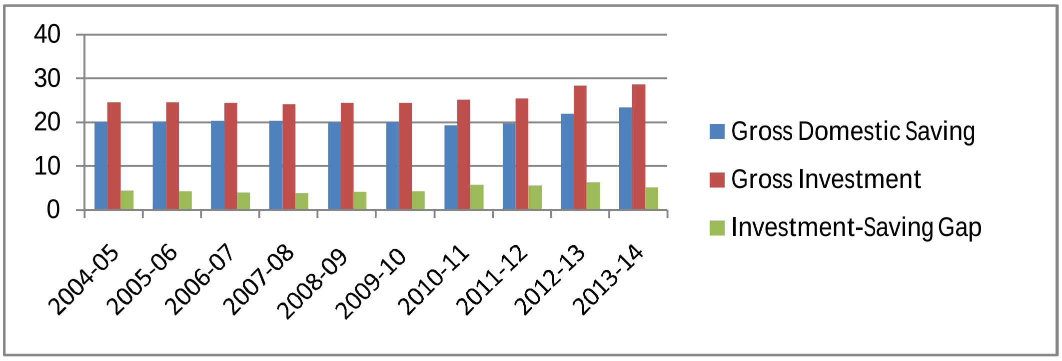
Figure 5.3.2.1.1 presents sector wise local proposed investment in Bangladesh in 2013-14 registered in the Board of Investment. It indicates the sector wise domestic investment in the fiscal year 2013-14 in Bangladesh. Figure also indicates that agro base industry, textile, chemical and service industry are also the major domestic investment sectors in Bangladesh in the fiscal year 2013-14, while the service industry occupies the highest attention a drastic increase to 42 % which is 13% more than that of the fiscal year 2011-12. Local investment in the agro base industry, textile and chemical industries have decreased largely in 2013-14 in Bangladesh. It is mainly due to the political unrest in Bangladesh from 2012-13, which is contineouing to date.

### 5.3.3 Saving Investment Gap in Bangladesh

High rates of saving and investment are essentially prerequisites for high economic growth, but domestic saving in Bangladesh, on which investment greatly depends, has remained stagnant at around 20.0% of GDP in the most recent years (Table 5.3.3.1 in Appendix). Public saving has always been negative in the country as the growing fiscal deficits in successive annual budgets. Domestic saving in the country therefore comes essentially from the private sector. Private saving is however, low partly because of weak intermediation in the banking sector but largely due to low per capita income.

Table 5.3.3.1 (in Appendix) shows that because of low domestic saving rates, gross capital formation has slowed down consistently in the recent years, hovering at around 24% of GDP. Domestic saving rate is increased over the period as the increasing trend of domestic investment demand in Bangladesh. But, the domestic demand of investment is more than the domestic saving. The domestic savings rate was 20.01 in 2004-05 and the figure rises to 23.43 % of GDP in 2013-14 while the gross domestic investment was 24.53 % in 2004-05 and the figure rises to 28.69 % of GDP in 2013-14 in Bangladesh. Therefore, there is clear saving-investment gap in this regard. In 2004-05, the gap was 4.2 % and it rises to 6.36 % in 2012-13 which is decreased a little bit at 5.26 % in the year 2013-14. The main reason behind the slowing down of investment has been a secular decline in public investment, which, as proportion of GDP, fell to a historic low of 4.6% in FY2008-09 from 6.2% in FY2004-05. As public investment did not increase, the private investment did not roll in either. The actual saving investment gap can be shown by the following Figure.

**Figure 5.3.3.1: Saving Investment Gap in Bangladesh from 2004-05 to 2013-14.**




Source: BER, 2014

Figure 5.3.3.1 presents the saving investment gap in Bangladesh from 2004-05 to 2013-14 which shows that both saving and investment increases over the periods. The saving investment gap in Bangladesh is remained almost steady space up to 2010-11, after that the gap is being increased. Figure further shows that gross investment reaches to 25 % of GDP in 2010-11 and it exceeds the mark of 25% in later period. It is hopefully that the investment savings gap is declined a bit in the year 2013-14, due to increase in the foreign exchange reserve in Bangladesh and decline in the domestic interest rate. Yet, the country needs a lot more resources to invest in physical infrastructure as well as for the development of power and gas sectors, which are among the major causes of the sluggish private investment in the country. The power sector alone will need as much as $10 billion of new investment, which cannot be generated from domestic sources.

Figure 5.3.3.2 presents a current investment trend in private sector in Bangladesh. It indicates that the investment in the private sector in Bangladesh is increased as the time passes away. The figure further indicates that there is a strong evidence of the private sector's involvement in the economy of Bangladesh. But, the investment figure is very low to the requirement of the country's development.

**Figure 5.3.3.2: Investment Trend in Private Sector in Bangladesh (in Crore Tk.)**

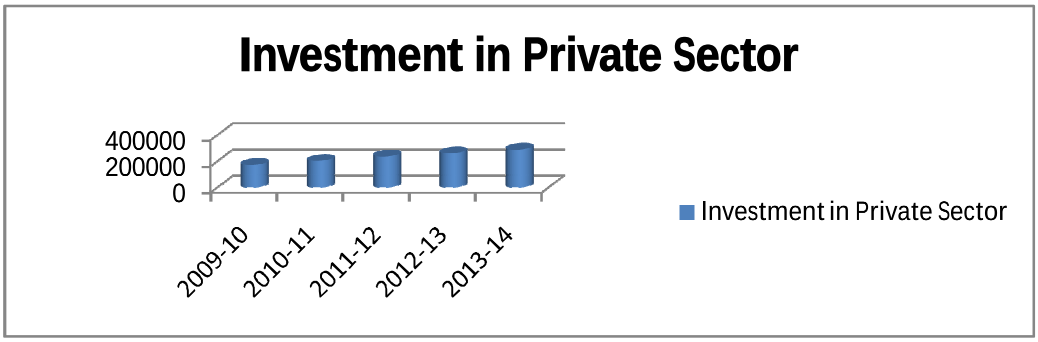



Table 5.3.3.2 (in Appendix) states that the targeted GDP growth in the present and in the coming years will require a considerable increase in investment-perhaps worth almost an additional 2% of GDP every year. Budget showed an investment shortfall of $1.04 billion in FY2009-10. The shortfall rises to $9.40 billion in 2013-14, when the cumulative shortfall stands at $ 28 billion. The huge investment need would require resource mobilization by increased public savings through higher revenue earnings, and increased private savings- by both individuals and the corporate sector. However, since available domestic saving will be insufficient to meet the needs of increased investment, the country will need larger doses of foreign direct investment (FDI) to meet the resource shortfall.

## 5.4 Foreign Private Direct Investment in Bangladesh

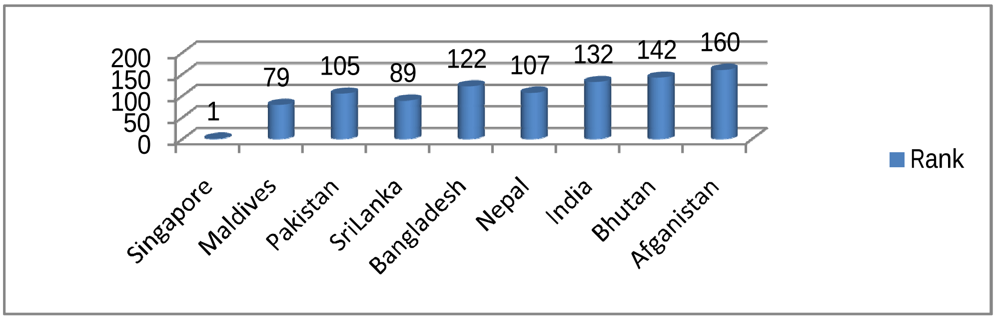
In the historical background of the investment saving gap domestically, there requires the international or multinational corporations or joint venture investors to fulfill the gap for the enhancement of the economic growth. Though, foreign investment has its costs, which may often exceed its benefits to the economy, it is inevitable for the country in this regard. To attract more FDI into the country, government has put in place an elaborate incentive package with wide-ranging investment-friendly support measures. The prevailing incentives, together with market-oriented reforms, significant socio-economic achievements and highly favourable demography, make Bangladesh one of the most attractive foreign investment destinations in the world.

### 5.4.1 Investment Climate of Bangladesh

The Doing Business 2011 report published by the World Bank and IFC ranked Bangladesh 122nd in the Ease Doing Business: Global Rank among 183 economies.

However, Bangladesh was ranked 24th in terms of protecting investors. Besides, the country was also ranked 78th in getting credit and 86th and 100th in starting a business and paying taxes respectively (Figure 5.4.1.1).

**Figure 5.4.1.1: Ease of Doing Business: Global Rank**




Source: Doing Business 2011, IFC, World Bank, 2012 (BER, 2012)

Therefore, Bangladesh is well positioned as a favourable investment destination because of its large and growing local market. The economy has experienced a moderately accelerated annual growth of 5.00-6.5 percent since 1996, a range of constraints notwithstanding.

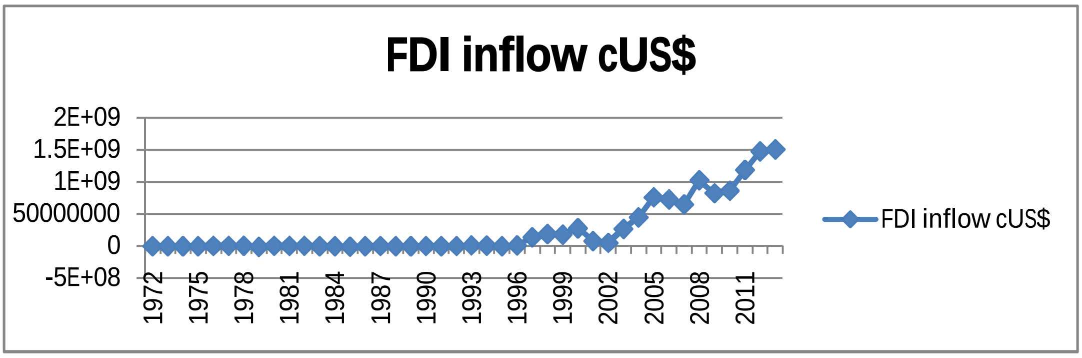
### 5.4.2 Present Trend of FDI Inflows in Bangladesh

Despite the wide-ranging incentives offered by Bangladesh to foreign investors, and the identification of the country by global institutions as a highly attractive investment destination, the volume of FDI has remained historically low in this country. In per capita terms, FDI in Bangladesh in 2008 was only $ 7, as compared to $ 31 in India and $ 32 in Pakistan. Not only that the volume of FDI is low in Bangladesh, it also lags well behind other countries of the region, as UNCTAD data presented in table below. The table shows that FDI inflow to Bangladesh was $1086 million in 2008, the highest so far in its history, but it fell significantly thereafter, falling by 34.1 percent to $716 million in 2009.

Table 5.4.2.1 (in Appendix) explains the net inflows of foreign direct investment in south Asian countries (as % of GDP). It shows that Vietnam is the highest destination of foreign direct investment inflows in the Asian countries. The highest foreign investment is arrived in 2007 in Vietnam and the figure stands at 8.66 % of GDP while the lowest amount was 2.78 % of GDP in 1990. On the other hand, India's highest and lowest foreign direct investments are 0.042 and 2.61 percent in 1980 and 2009 respectively. For Pakistan the net inflows of FDI are 0.183 and 3.67 the highest and the lowest in 1972 and 2007 respectively. Again, the highest foreign direct investment in Bangladesh is 2.765 % of GDP in 2000. In every cases the net inflows of foreign direct investment is lower than the level (highest and lowest) of the other Asian countries. The FDI inflow in Bangladesh is below a little bit from India and Philippines but many folds lower from that of the Vietnam and Pakistan. The table thus, provides the poor scenarios of the FDI inflows in Bangladesh that indicates a clear message that there is a tremendous scope of foreign direct investment here.

Theories explain that the more FDI inflows, the more of economic growth and the more of development. Bangladesh has been failed to draw the attentions of the foreign multinational companies in this regard compared to other Asian countries. The net FDI inflow is accounted US$ 5.36 million in 1981 and the figure rises to the peak at US$ 1501.65 million in the year 2013 in Bangladesh. FDI inflow falls drastically in the year 2001 and 2002. With a small breaking down, it further rises continuously over the year in Bangladesh (WDI, 2014).

**Figure 5.4.2.1: FDI, Net Inflows in Bangladesh (BoP, Constant 2005 US$)**




Source: Data of World Development Indicators, 2014.

Figure 5.4.2.1 presents the actual net FDI inflows in Bangladesh from 1972 to 2013 as in the US$. It is observed from the figure that there are three phases of net FDI inflows in Bangladesh. The first phase begins from 1972 and end at 1996, when inflows of foreign direct investment are almost remained the same and slope of the FDI curve is constant with the horizontal axis. The second phase begins from 1996 and ends at 2002, while net FDI inflows begins to rise and reaches to the peak point in 1999 and then falls at the end point in 2002. That is, this phase consists with the recovery and recession in the field of FDI inflows in Bangladesh. The final phase begins from 2002 and it is contineouing to date (2013). This phase is characterized by the upward rising trend of FDI inflows in Bangladesh but there is a little cut of the figures from the last two years mainly for political unrest in the country.

Table 5.4.2.2 (in Appendix) states the sources of the joint ventures and 100% foreign investment projects (in million US$) in Bangladesh. It shows that China is the highest source of FDI inflows in Bangladesh and it projects for Bangladesh US$ 1676.19 million in 2013-14. India is in the next position as the source of FDI inflows (157.22), while USA is in the third position in investing 100% foreign direct investment project in Bangladesh. Other individual remarkable sources of FDI inflows in Bangladesh are Singapore, Japan, Taiwan, Hong Kong, South Korea, and Malaysia in 2013-14.

Table 5.4.2.3 (in Appendix) shows that FDI inflow in Bangladesh was 716 million US$ while the stock was 5139 million US$ in 2009. Table further indicates that each country in the table has very large amount of stock of FDI but inflows of FDI are very small. In this case, Bangladesh, India and Vietnam are the remarkable.

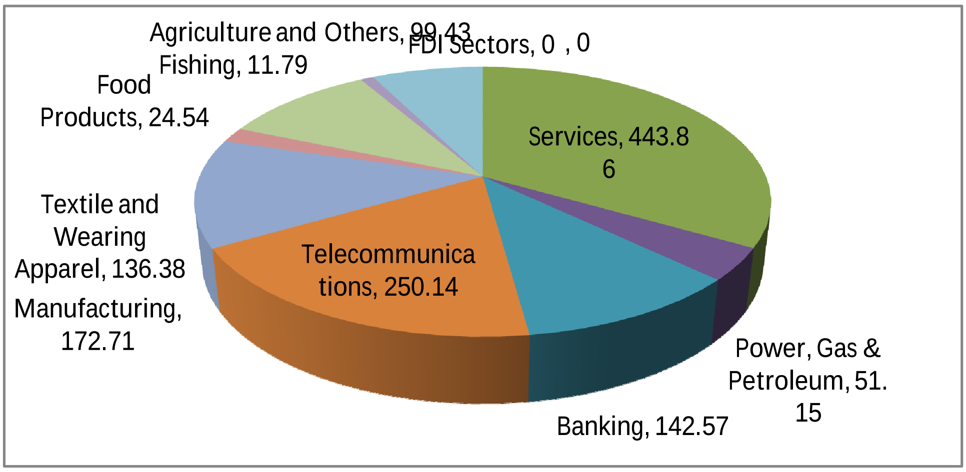
Table 5.4.2.4 (in Appendix) discusses the proposed local and foreign private investment in Bangladesh as the provisional data from Board of Investment. It shows that the number of proposed local projects declines from 1754 in 2006 to 1600 in 2010 in Bangladesh but the project value is increased from US$ 2662 million to US$ 6298 million in 2010. The number of proposed foreign projects is increased from 135 in 2006 to 185 in 2010 in Bangladesh. The project value is remained almost the same with drastic fluctuations. The project value of foreign investment in Bangladesh was US$ 3,621 million in 2006 and it reaches at US$ 3,174 million in 2010. That is, the number of projects has decreased but the project values are increased remarkably in recent years in Bangladesh.

### 5.4.3 Distribution of FDI Inflows by Sectors in Bangladesh

A prominent feature of FDI inflows in Bangladesh is that the bulk of the FDI is concentrated in the non-tradable, services sectors (Figure 5.4.3.1), which hardly contribute anything to export earnings but generate repayment obligations in respect of profits, dividends and repatriation of capital.

Table 5.4.3.1 (in Appendix) states that a significant change in the composition of investment is noticed in the investment proposals registered with the BOI in 2010. In the proposals, the highest 30.8 percent of the investment was offered for the services sectors. The proposed investments for other sectors were 30 percent for textiles, 18.8 percent for chemicals, 7.8 percent for engineering, tannery & leather, chemical and agro base industry in Bangladesh. In 2013-14, agro-based industry accounts 28.70 million US$, tannery and leather 30.94 million US$, Engineering industry 222.38 million US$ and service industries are accounted by 1679.14 million US$ in Bangladesh.

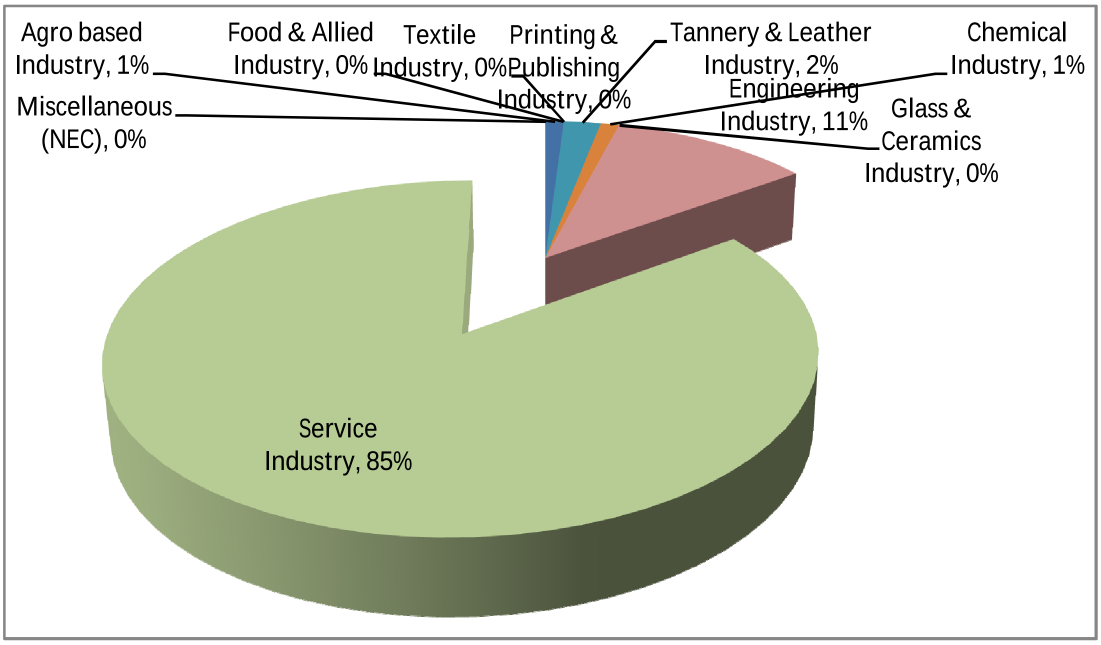
**Figure 5.4.3.1: Distribution of FDI Inflows by Sectors in 2008 (in million US$)**




Source: Bangladesh Bank FDI Survey Report, July-Dec. 2009; UNCTAD, World Investment Report 2010.

Figure 5.4.3.1 shows that the composition of FDI changed in the direction of manufacturing and other tradable sectors in 2009, but even then the services sectors accounted for 62 percent of total FDI inflows. Power, gas and petroleum cuts 51.15 million US$ while services 443.86, telecommunication 250.14, manufacturing sector 172.71, banking 142.57, and textiles cuts 136.38 million US$ in 2009 in Bangladesh.

**Figure 5.4.3.2: Distribution of FDI Inflows Proposed by Sectors in 2013-14** **(in Percentages)**




Source: Bangladesh Economic Review, 2014.

Figure 5.4.3.2 indicates that most of the FDI flows in the service sector including banking in Bangladesh and it accounts of 85% of FDI in 2013-14. Industry has been another sector for FDI inflows in Bangladesh. The agro based industry, the ceramic industry, the tannery and leather industry, engineering industry have also been drawn the attention of foreign investors in Bangladesh.

## 5.5 Data Description of the External Sector

### 5.5.1 Trend and Pattern of External Sector in Bangladesh

International trade was in turmoil due to global economic recession in 2008 and 2009. This crisis had an impact on the economy of Bangladesh. Import expenditure and export earning both plummeted during the first six months of the FY 2011-12. Investment in the power sector and oil price hike in the international market created pressure on the foreign exchange reserve of Bangladesh which resulted in depreciation of Taka against Dollar and the current account fell under pressure. However, in FY 2010-11 and FY 2011-12 export earnings and import expenditure increased by 29.31 and 5.66 percent and 41.8 and 5.5 percent respectively. Current account balance of FY 2010-11 and FY 2011-12 stood at US$ 995 and US$ 1360 million respectively. Foreign exchange reserve as on 30 June, 2012 was US$ 10.364 billion. The foreign exchange rate of Bangladesh remained stable in 2013-14 due to the contractual Monetary Policy adopted by the Bangladesh Bank. The export growth is increased by 14.0 percent in the first eight months (July to February) of 2013-14 and figure stands at 19,829 million US$. On the other hand, the import growth rate is increased by 16.52 percent of the same time and the figure rieses to 23,096.40 million US$. The foreign exchange reserve in Bangladesh stands at 20.37 billion US$ on 30 April, 2014 (Table and Figure have already mentioned in the previous chapter of this study). Report shows that GDP, exports earnings and import payments are increased as the years pass away. Trade openness also rises corresponding with them. In 1973, GDP, exports and imports were 15572.07, 7565.46 and 3323.62 million US$ respectively while trade openness ratio was only 26.2. After the passes of time, GDP, exports and imports are accounted at 97261.98, 22905.71 and 26467.89 million US$ in 2013; while the trade openness ratio is calculated at 50.8 percent in Bangladesh. It is due to the more trade liberalization and open economic policy of the country. It is observed that trade openness has got a new dimension in Bangladesh after 1990 with open economic policy. The degree of trade openness in Bangladesh from 1972 to 2013 shows that it was very low in 1973 and the figures remained almost same up to 1990 with a little change. After then, the degree of trade openness has got a new era. During this periods countries were becoming more and more integrated economically and reducing exports and imports tariffs among themselves;

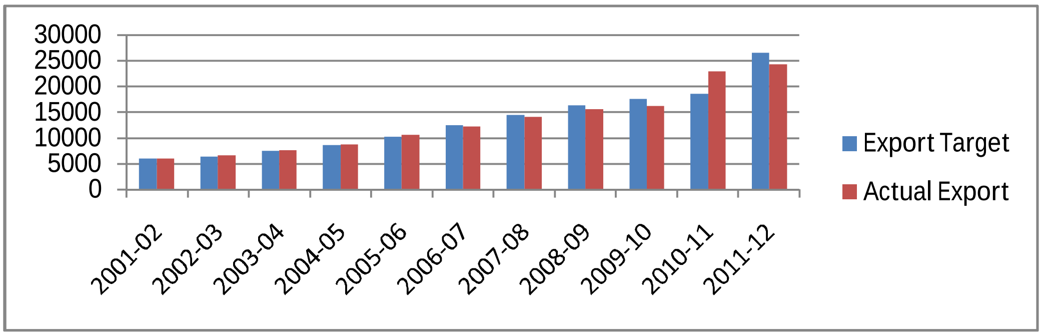
Bangladesh was not beyond this race. The result is the more trade liberalization that enhances the country's export earnings and import substitute goods. Resulting, the degree of trade openness is increased over the periods in Bangladesh. Trade openness in Bangladesh is reduced a few in 2009 and 2010 due to the world economic rescissions and then the country recovers the pace of trade openness again (WDI 2014, & Own Estimated Trade Openness).

### 5.5.2 Export Performance of the Economy

The export earnings in the first eight months (July to February) in 2013-14 is increased by 14.0 percent compare to the same period of the previous year 2012-13 and the volume stands to 19,829 million US$. The remarkable contribution of garments and knitwear goods is remained in the considerable period in 2013-14. It is observed that export earnings from the leather (44.2 percent), footwear (31.8 percent), handicraft (25 percent), frozen food (24.1), knitwear (17.5 percent), garments (15.9 percent), and other primary commodities (31.7 percent) are increased in this time. But export earnings are decreased in the petroleum goods (51.8 percent), raw jute (47.8 percent), and jute products (12.8 percent). The export earning compositions in Bangladesh are given by the table below.

Table 5.5.2.1 (in Appendix) presents that the export earnings of Bangladesh stood at US$ 24288 million in FY 2011-12, which was 5.9 percent higher than the export earnings (US$ 22928 million) of FY 2010-11. An analysis of composition of exports in FY 2011-12 by major categories reveals that the export earnings over the year 2010-11, increased mainly for footwear (30.1 percent), engineering products (21.1 percent), woven garments (13.9 percent) and leather (10.8 percent). On the other hand, export earnings decreased in respect of raw jute (25.4 percent), ceramic product (10.8 percent), and jute goods (7.5 percent). Export growth and composition by commodities from FY 2009-10 to FY 2011-12. In 2013-14, export growth rates are 5.8% at primary product, 24% at frozen foods, 14.4% at industrial product, 44% for leather goods, 31% at footwear, 25% and 25% at petroleum goods in Bangladesh (Bangladesh Export Promotion Bureau up to Dec. 2013 & BER, 2014). Table 5.5.2.2 (in Appendix) shows that in terms of export to the SAARC countries from Bangladesh, India secured the top position and in FY 2011-12. Its quantity among SAARC countries is about 79 percent (498.42 million US$). It is to be noted that export in the SAARC countries in FY 2011-12 compared to the total export of Bangladesh is only about 4 percent (670.36 million US$) and the contribution of Maldives is the lowest (1.78 million US$).

**Figure 5.5.2.1: Export Performance (Targeted and Achieved) of Bangladesh (Million US$)**




Source: Bangladesh Export Promotion Bureau (Bangladesh Economic Review 2012).

Figure 5.5.2.1 discusses the export performance (targeted and achieved) of Bangladesh over the year (in million US$). It is evident that despite global recession, export target in the last two fiscal years were almost achieved. The targeted and achieved exports were almost same from 2001-02 to 2005-06. After then exports target is not fulfilled up to 2011-12 but the year 2010-11 are the exceptional period when actual exports are much more than the targets. This is due to the immediate beginning of the recovery from the world economic depression in 2009-10.

### 5.5.3 Status and Composition of Imports in Bangladesh

Table 5.5.3.1 (in Appendix) describes the comparative situation of commodity-wise import payments in Bangladesh from 2005-06 to 2013-14. It shows that import payments are spent for mainly industrial commodities. In 2005-06, it cuts a figure of 3002 million US$ and it becomes with a rising trend to 9263 million US$ in 2011-12 but now (2013-14) it stands at 5370 million US$. Major primary goods and capital machinery are second and third imports payment items in Bangladesh. In 2005-06, the import payments were 1854 million US$, which stands at 2877 million US$ in 2013-14. The capital machinery on the other hand, cuts a figure of 1458 million US$ in 2005-06 for import payments and the figure reduces at 1264 million US$ in 2013-14 in Bangladesh. The total import payments was 14,746 million US$ in 2005-06 and the figure rises to 23,096 million US$ in 2013-14 which occurs the 16.5 % of change than that of the previous year in Bangladesh (BB, 2014 & BER, 2014).

### 5.5.4 Balance of Payment in Bangladesh

The trade balance recorded a deficit of US$ 3,297 million during 2004-05 compared to deficit of US$ 2,319 million during 2003-04. The current accounts balance recorded a deficit of US$ 518 million during 2004-05 against the surplus of US$ 176 million over previous year. The current account balance showed a deficit despite a 14.61 percent increase in current transfers compared to previous year because of a 42.14 percent decrease in trade account and 71.39 percent decrease in income account. The overall balance showed a surplus of US$ 161 million during 2004-05 compared to the surplus of US$ 171 million during 2003-04 due to mainly a remarkable surplus in financial accounts of US$ 744 million, particularly for MLT loans of US$ 940 million. The current account balance has had some diverse experience throughout the 1990s. At the beginning of the decade (FY'92), Bangladesh had a negative current account balance of (-) $118 million which reached to (-) $1291 million in the beginning of the second half (FY'96) due to a huge negative trade balance of (-) $3063 million due to the large volume of imports from abroad. It is notable to mention that in FY'96 Bangladesh observed the highest negative trade balance during the last one and a half decade. The current account balance has witnessed some improvements by the end of last decade and enjoyed small but positive balance of $2 million. On the other hand, in FY'01, Bangladesh experienced a negative balance of (-) $1019 million in its current account. In FY'03, the current account balance amounted to a positive sum of $328 million which facilitated the overall balance of payments to reach a positive amount of $815 million by the end of the said fiscal year (BER, & BB, 2014).

### 5.5.5 Exchange Rate in Bangladesh

Bangladesh pursued a flexible exchange rate policy for over a period of more than ten years. Formerly, exchange rate of taka were adjusted from time to time for keeping it competitive based on inflation rate and movement of exchange rates as well as trade weights with partner countries. However, recently the government has taken a bold step in exchange rate management. Since May 31, 2003 Bangladesh introduced a fully market based exchange rate. Introduction of free float exchange rate has not brought any significant instability in the economy so far. The US dollar remained stronger against Taka during late 2003 through April 2004. On June 30, 2004 the official and inter bank market Taka-Dollar exchange rate remained stable between Taka 59.30 and Taka 61.50 respectively. After that the rate was moving between Tk. 61 to Tk. 62.20 in the market. However the currency depreciation continued. The Bangladesh Bank is not present in the market on a day-to-day basis and undertakes purchase or sale transactions with the dealer banks only as needed to maintain orderly market conditions. As of 12$^{th}$ October 2015 Exchange Rate in Bangladesh stands at Tk. 78.35 against US $1.

Table 5.5.5.1 (in Appendix) analyzes the average exchange rate in Bangladesh (Tk. per US$) from 2002 to 2013. The average exchange rate in Bangladesh was 57.90 Tk. against per US$ in 2002 which is increased gradually over the period and rises to 77.74 Tk. in 2013. Exchange rate reaches to the highest figure at 81.87 Tk. against per US$ in 2011.

### 5.5.6 Foreign Exchange Reserve in Bangladesh

Growth of export earnings and remarkable increase of remittance from expatriate Bangladeshis caused foreign exchange reserve to rise to US$ 2,705 million on June 30, 2004 from US$ 2,470 million, implying 9.51 percent growth over the same date of previous year. As of June 30, 2005 the foreign exchange reserve stood at US$ 3,024 million. Table 5.5.6.1 (in Appendix) presents the gross foreign exchange reserve of Bangladesh Bank reached at US$ 10,364.43 million at the end of FY 2011-12, which is 5.02 percent lower than US$ 10912 million compared to the previous year. Foreign exchange reserve reaches to the record marks in the history of Bangladesh in 2014 while it cuts the figure US$ 20,370 and it reaches to the mark of US$ 23,000 in the March 2015. In order to maintain the long term stability of the country's reserves and diversifying the external asset portfolio, BB invested in sovereign/ highly reputed corporate bonds, Treasury Bills of US government and in short term deposit with highly reputed commercial banks.

**5.6 Conclusion**

In this chapter, the data on domestic investment, foreign direct investment, country's capital formation, stock of labour, exchange rate, employment, foreign exchange reserve, export, import, trade openness, balance of payment with their multi-dimensional components and GDP growth have been analyzed using both tabulation and graphical ways. Data have been collected from basically secondary sources. For the general purpose of the thesis, data on GDP at current and constant prices, domestic investment, its various components, savings, capital formation, stock of labour, human capital, school enrolment, FDI inflows, sectoral FDI inflows, FDI stocks, exchange rate, inflation, export, import, trade openness, its various components, its growth rate etc. have been critically analyzed. This chapter also describes data graphically so that the long run trend of the variables is shown. The graphs show the positive and upward slopes of FDI, domestic investment, savings, capital formation, trade openness curves but the shares to GDP are quite low and steady with fluctuations in Bangladesh. In order to show the long run causal relationship, the time series data of the variables for estimating functions covering the period 1972 to 2013 are shown by the grand tables which have been adjointed in their respective findings chapter. For having results mathematically, only those variables are considered of which data are available in Bangladesh. Moreover, for the estimation of the domestic investment, FDI and trade openness functions the related variables such as savings, capital formation, real export, real import, real exchange rate, inflation, credit availability, human capital as secondary education enrolments, stock of labour as active population proxied by population of age 15-64 years, GDP, growth rate of GDP as well as share to GDP etc. have been analyzed. Besides, for the fulfillment of the requirements of the study some other relevant variables (trade liberalization, tariffs, BOP, employment, sectoral share of export and import, remittances, foreign exchange reserve etc.) have also been described briefly that would enrich the research work.

# Chapter Six: Empirical Econometric Methodology

## 6. 1 Introduction

Research methodology is a way to systematically solve the research problem. The research methods consider the logic behind the methods he uses in the context of their research study and explain why he is using a particular method or technique and why he is not using others so that research results are capable of being evaluated either by the researcher himself or by others. It is observed that time series data used in many econometric studies create some special problems for econometricians. It is assumed that time series data are stationary. Hypotheses testing, which is based on small sample or asymptotic distributions of the data because, if this assumption is not taken in the estimation process, the traditional estimates, is no longer valid. The aim of this chapter is to illustrate the recently developed econometric models to overcome the non-stationarity in data of the considered variables of different functions and to explain short and long run relationships among domestic investment, FDI, trade openness and economic growth in Bangladesh. This chapter further tries to explain the theoretical basis of the estimation of domestic investment, FDI, trade openness and growth functions for Bangladesh so that it can have found concrete and robust findings for the satisfaction of the objectives.

In this context, a disaggregated econometric analysis has been carried out in accordance with the hypotheses of this study throughout this chapter. The pre-estimation techniques (The Chow test, the Coppock Instability Index, Jarque-Bera test, correlation matrix etc.) have been applied first and then the stationarity of the data of the variables of different functions have been justified by the correlogram, the ADF, the D-F (GLS), and the Phillips-Perron tests. Johansen Maximum Likelihood method has been used for cointegration test. The popular OLS estimation method has been used for estimating different functions. The VECM and VAR methods are also used to show the short and long run elasticities while the Granger Causality test is applied for showing short run causal relationships of different components at the disaggregated level. This chapter also discussed impulse response analysis (IRA) and variance decompositions for the shocks of the data series and the compositions of the variance of the dependent variable. Finally, the model diagnostics like L-M test, B-G test for autocorrelation problem with normality, WGH test, and the CUSUM and CUSUMSQ tests have been discussed in this chapter.

### 6.1.1 Analytical Framework

The objectives of the study are to estimate the domestic investment, FDI, trade openness and GDP growth functions in order to assess the impact of the different factors on these variables at the disaggregated level in the economy of Bangladesh. In this regard, the standard ordinary least squares (OLS) method is used (Farzana, 2014 and Moniruzzaman, 2011). As the another objective of the study is to find out whether, there are any relationships among domestic investment, FDI, trade openness and GDP growth, as well as among their various components of the functions, the Solow growth model, Romer endogenous growth model and the aggregate production function (APF) model have been used because they are widely used in the literature (Fosu and Magnus, 2006; Herzeret al., 2006; Mansouri, 2005; Kohpaiboon, 2004; Ukpolo, 1994; Fosu, 1990; Feder, 1983;) and it assumes, along with traditional input of production-labor and capital, other unconventional input like FDI, trade openness which can also be influential to growth. In the similar fashion, the disaggregated econometric estimable functions have been formed and estimated with OLS method.

### 6.1.2 Data Sources and Sample Size

As the study is quantitative in nature, the secondary data have basically been used for this study. In order to examine the impact of and the relationships among domestic investment, FDI, trade openness and economic growth in Bangladesh, this study applies Bangladesh's annual time series data. The core variables of this study are economic growth (*gdp*) defined as the GDP at constant price, domestic investment (*di*) proxied by the gross fixed capital formation (GCF), foreign direct investment (*FDI)* is the value of net foreign direct investment inflows, trade openness (*to*) is the sum of export and import values to GDP and Labor stock (*l*) measured in terms of labor force proxied by active population ages 15 to 64 years % of the total population. Since capital stock is not available for Bangladesh (*k*), it has been used as a proxy by the real value of gross capital formation (GCF) (Kohpaiboon, 2004; and Mansouri, 2004).

The data of the variables used in the regression models (e.g. *fdi, gdp, grgdp, gcf, di, dc, hc, fi, to, l, rx, rer, cr, ir, rm, tot* and *wr*) have been retrieved from UN Data. They all are US data and are denominated in US Dollar (constant). The era of interest ranges from the first quarter of 1972 to the last quarter of 2013. The absolute change in GDP has been computed out of the data on GDP. The data of the variables have been sourced from; the secondary sources, such as, the Statistical Yearbooks of Bangladesh published by

Bangladesh Bureau of Statistics, Bangladesh Economic Reviews published by the Ministry of Finance, Bangladesh Economic Surveys published by the Government of Bangladesh, and Economic Indicators published by the Bangladesh Bank. The data from the database of the World Development Indicators (WDI) published by the World Bank and the Direction of Trade Statistics (International Monetary Fund) have also been used in the study. Other sources of data have also been used for the requirement of the estimations. The samples have covered forty two (42) annual observations (1972 to 2013). Data of the concerned variables have been performed, estimated and analyzed by the Statistical Software Stata 10.1; and with the popular Econometric Software Eviews 5.1 and 7.1.

## 6.2 Econometric Estimable Functions

On the basis of research questions the important objectives of this study are to assess the impact of domestic investment, FDI, trade openness on economic growth and their causal relationships associated with them. This study further aims to assess the influences of different components of domestic investment, FDI and trade openness on them in Bangladesh as well as to examine the relationships associated with them at the disaggregated level. In this context, the study tries to form the following four estimable regression functions for Bangladesh with only systematic affecting variables and those are also supported by the literature.

### 6.2.1 Domestic Investment Function for Bangladesh

A number of models have been employed in the literature to explain the factors of domestic investment, among these models; the neoclassical investment model and the accelerator investment model are important. This study has been considered the accelerator investment model for overcoming the drawbacks of the neoclassical investment model. Theoretically, most of the literatures pointed out that the variables (Growth rate of GDP, FDI, financial intermediation, exports, human capital, and domestic credit availability) contribute positively to the growth of domestic investment in developing countries (Lucus, 1998; Romer, 1990; Borensztein, et al., 1998; Levin and Beck, 2000; Gura and Goodwin, 2000; Madsen, 2002; Khatib, 2011). Specifically, on the basis of the existing literature and theories the domestic investment model for Bangladesh is given in the multiple regression form:

$$di = \delta_0 + \delta_1\, grgdp + \delta_2\, fdi + \delta_3\, fi + \delta_4 rx + \delta_5\, hc + \delta_6 dc + v \text{ ........... } (6.2.1.1)$$

Transforming into logarithms, the equation is:

$$\ln di = \delta_0 + \delta_1 \ln grgdp + \delta_2 \ln fdi + \delta_3 \ln fi + \delta_4 \ln rx + \delta_5 \ln hc + \delta_6 \ln dc + \nu \quad \ldots(6.2.1.2)$$

Where, *di*= domestic investment proxy of gross capital formation over GDP; *grgdp*= growth rate of real GDP; *fdi*= foreign direct investment as a ratio of GDP; *rx* = exports of goods and services as a ratio of GDP; *fi* = financial intermediation as calculated by $M_2$ as a ratio of GDP; *hc* = human capital proxied by secondary school enrolment ratio (% of gross enrolment); *cr* = domestic credit availability as a ratio of GDP; and ν = error term.

### 6.2.2 Foreign Direct Investment Function

The foreign direct investment model to estimate was solely the following single equation suggested by Ahmed and Tanin (2010) in the literature:

$$fdi = \gamma_0 + \gamma_1 gdp + \gamma_2 grgdp + \gamma_3 gcf + \gamma_4 to + \gamma_5 l + \gamma_6 wr + \mu \quad \ldots\ldots\ldots\ldots (6.2.2.1)$$

Where, *fdi, gdpc, grgdp, to, l, wr* and $\mu$ stand for the inward flows of FDI (Current US $), the GDP (Current US $), the annual percentage of GDP growth rate, the gross capital formation, the trade openness, the stock of labour force ratio to the total population, the wage rate and the error term respectively. To sum up, the structural equation make up the FDI function that is going to be estimated in the logarithmic form.

$$\ln fdi = \gamma_0 + \gamma_1 \ln gdp + \gamma_2 \ln grgdp + \gamma_3 \ln gcf + \gamma_4 \ln to + \gamma_5 \ln l + \gamma_6 \ln wr + \mu \quad \ldots.. (6.2.2.2)$$

The endogenous variables of the model are: *fdi* and *gdp* (and consequently *grgdp*). The degree of trade openness has been computed out of data on exports, imports ratio to the GDP of Bangladesh. The variables *gcf, to, l,* and *wr* are treated as exogenous.

### 6.2.3 Trade Openness Function in Bangladesh

Trade openness is expected to affect exports and imports of goods and services. Imports are expected to raise as the country increases its demand for foreign goods and services. The demand for intermediate and investment goods rises. Similarly, greater openness is expected to increase exports as the country gets integrated in the world market and begins to produce for it. In order to test the above, the trade openness equation is formulated.

$$to = \alpha_1 + \alpha_2 rx + \alpha_3 rm + \alpha_4 y - \alpha_5 tot + \alpha_6 rer - \alpha_7 ri + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots (6.2.3.1)$$

The trade openness (*to*) is the function of real exports (*rx*), real imports (*rm*), domestic income (*y*) proxied by GDP, the terms of trade (*tot*); the real inflation (*ri*); and the real exchange rate (*rer*). All variables are in the logarithms. It is expected a positive sign on the coefficients of real exports (*rx*) and domestic real income (*y*) proxy for GDP, real import

($rm$) and real exchange rate ($rer$), but a negative sign on terms of trade ($tot$) and real inflation ($ri$) while the $\varepsilon$ is the white noise error term.

Transforming into logarithms and avoiding negative signs, the equation is:

$$\ln to = \alpha_1 + \alpha_2 \ln gdp + \alpha_3 \ln rx + \alpha_4 \ln rm + \alpha_5 \ln tot + \alpha_6 \ln rer + \alpha_7 \ln ri + \varepsilon \ldots \quad (6.2.3.2)$$

Theoretically, it is seen that when both real exports and real imports increase with greater trade openness real exchange rate is also increased.

### 6.2.4 The GDP Growth Function for Bangladesh

As part of the model specification (the Solow, the Romer endogenous growth model and APF model) of this study, the estimating regression function in the log-linear form is specified as follows:

$$\ln GDP_t = \alpha + \beta \ln L_t + \gamma \ln K_t + \delta \ln FDI_t + \phi \ln TO_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots.. \quad (6.2.4.1)$$

Taking the lowercase of the variables the equation is as follows:

$$\ln gdp_t = \alpha + \beta \ln l_t + \gamma \ln k_t + \delta \ln fdi_t + \phi \ln to_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \quad (6.2.4.2)$$

Where, *gdp* represents the economic growth of a country, *l*, *k*, *fdi* and *to,* represent the stock of labour force proxied by the active population ages 15-64 years % of the total population, stock of capital (since stock of capital in Bangladesh is unavailable, the gross capital formation is used as the proxy for *k*) proxy of domestic investment, foreign direct investment, and trade openness respectively. The disturbance term $\varepsilon_t$ is assumed to be independently and identically distributed. The subscript (t) denotes time.

## 6.3 Econometric Approaches

### 6.3.1 Econometric Designs

In order to fulfillment of the objectives of the study and to test the hypotheses improved econometric analytical techniques with up to date available data have been carried out through this chapter. The data of the variables of different functions are transformed into natural logarithms. There are four reasons for why variables are converted into natural logarithms. First, the coefficients of the cointegrating vector can be interpreted as long run elasticities if the variables are in logs. Second, if the variables are in logs, the first difference can be interpreted as growth rates. Third, if the variables are transformed into logarithm, it reduces the heteroscedasticity problem from the model. Fourth, the data of the variables with logarithms tend to be stationary. In this study, the economic growth (stated as GDP) is considered as dependent variable. In contrast, stock of labour force, domestic investment proxy of gross capital formation, FDI and trade openness are considered as the explanatory variables. At the disaggregated level, domestic investment, FDI and trade openness in Bangladesh have been further considered as the dependent variables in their respective functions. The empirical procedures of this study thus proceed as follows:

*First*, the nature of the data distribution is examined by using the standard descriptive statistics (mean, median, standard deviation, skewness and kurtosis) of time series analysis with correlation matrix and with checking the normality of distribution by invoking the Jarque-Bera test. For testing structural break point and the stability of the data the pre-estimation tests like the Chow structural breakpoint test and Coppock Instability Index etc. have also been carried out. *Second*, it proceeds to test stationarity of the time series data of the variables, the unit root tests (the correlogram test, the ADF test, the D-F (GLS) and the Phillips-Perron test) have been applied in this regard. If these tests confirm stationarity in the data of each variable that is, if they all are integrated in the same order, the Johansen Maximum likelihood method that includes the trace and the max-eigen value tests are to be applied then for cointegration test. *Third*, if the variables have at least one long run cointegrated relations between them (pair-wise), the functions are to be estimated appropriately by the popular Ordinary Least Squares (OLS) method. Otherwise, its application may lead to misleading inferences in the presence of spurious correlation (Granger & Newbold, 1974). The Wald test has also been applied to support the OLS estimation of the functions for the significance of the coefficients. *Fourth*, the vector error correction modeling (VECM) has been carried out in this study for examining the short and long run causality of the variables of different functions. It furthers shows the short run dynamics to the long run equilibrium of the variables by the significance of its ECT term. The vector autoregression (VAR) model has also been applied in this study for examining the short and long run elasticities of the independent variables for domestic investment, FDI, trade openness as well as GDP growth function. *Fifth*, Augmented Granger Causality test has been conducted then for examining the short run causal relationships (pair-wise) among the core variables as well as at the disaggregated level for each of the function. Impulse response analysis and the variance decompositions methods then have been applied for examining the shocks of the standard deviation and composition of the functions. *Finally*, for the robustness of the results model diagnostic test (post-estimation test) like L-M test, the B-G test, and the White general heteroscedasticity test have been applied. Again, for the model stability the popular CUSUM and CUSUMSQ tests have also been applied in this study. All these econometric procedures could enrich the findings of the study.

## 6.4 Empirical Econometric Methods

### 6.4.1 Test for Normality of the Variables

Normality tests are used to determine whether a data set is well modeled by a normal distribution or not. Normal distribution has a unique place in the theoretical and applied statistics. The assumption that variables like FDI, labour, capital stock, export, import, domestic investment, saving, GDP growth etc. follow normal distribution occurs repeatedly in statistical test of significance. Consequences of violating the assumption vary from relatively severe for inferences on variables. The model, the researcher has chosen for explaining their behavior he would like to find out whether the model satisfies the assumptions of CLRM. There is one assumption that one should like to check, namely, the normality of the disturbance term, $u_t$. Recall that the *t* and *F* tests used before require that the error term follow the normal distribution. Otherwise the testing procedure will not be valid in small or finite samples (Gujarati, 2012). There are several methods of assessing whether data are normally distributed or not. The Jarque-Bera and Lagrange-Multiplier (L-M) tests are of them.

#### 6.4.1.1 The Jarque-Bera Test of Normality

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 and uses the following test statistic:

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(6.4.1.1)}$$

Where, n = sample size, S= skewness coefficient, and K= 3. Therefore, the J-B test of normality is a test of the joint hypothesis that S and K are 0 and 3 respectively. In that case, the value of the J-B statistic is expected to be 0. Under the null hypothesis that the residuals are normally distributed, Jarque and Bera showed that asymptotically (i.e. in large samples) the J-B statistic given in (6.4.1.1) that follows the chi-square distribution with 2 degrees of freedom. 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).

### 6.4.2 The Chow Structural Break Point Test

Generally time series data suffers from structural break problem. Thus, the researcher tries to check the structural break in the data series before or after conducting the econometric analysis of data. Two common tests are available in the standard text book and these tests can be achieved by Eviews Software. Therefore, the researcher has been applied either the Chow test (pre-estimation test) or the CUSUM (post-estimation test) test. The first one is discussed now but the later one has been discussed in the later portion of this chapter. The structural changes in trade pattern before liberalization and after liberalization periods (1990) are test by using ‘Chow Break Point’ test. It is essential for long run time series to indentify parameter stability over the period of investigation. Two types of diagnostic tests are generally used for structural breakpoint-Chow test is used when the possible breakpoint in the data series can be identified a ‘priory’ and CUSUM test is used when the break point in the data is not known a ‘priory’ (Seddighi et al., 2000 and Moniruzzaman, 2011). 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 which can be formulated as:

$$F = \frac{[RSS - (RSS_1 + RSS_2) / K]}{(RSS_1 + RSS_2) / n_1 + n_2 - 2k} \quad \ldots\ldots (6.4.2.1)$$

Where, RSS = RSS of the combined regression model of $n_1$ and $n_2$ observation with ($n_1$ +$n_2$ -2k) degree of freedom;

$RSS_1$ = RSS of the trend regression model of $n_1$ observations with df = ($n_1$-k);

$RSS_2$ = RSS of the trend regression model of $n_2$ observations with df = ($n_2$-k);

$N_1$ = Pre-trade liberalization period observations;

$N_2$ = Post-trade liberalization period observations; and

K = number of parameters to be estimated.

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).

### 6.4.3 The Coppock Instability Index (CII)

The pattern of stability of time series data during both periods (pre and post-liberalizaiton) as well as overall study is measured by the Coppock's Instability Index (1962). The CII is followed by Moniruzzaman (2011). The Coppock's Instability Index is measured by the following steps:

i) taking log of the time series values;
ii) subtracting the log value in year $t_1$ from the year $t_0$ in order to get the first difference of the log values;
iii) taking arithmetic mean of the log first difference value;
iv) subtracting mean log value from the first difference value to get actual and average log differences;
v) the log differences are squared and summed up and divided by N-1 years to get the log variances of the concerned series; and finally
vi) taking square root of the log variance and obtaining antilog of the square root value.

The coppock Instability Index thus, can be then measured by the following algebraic formula**:**

$$CII = [Anti\log(\sqrt{\log v - 1})] \times 100 \qquad (6.4.3.1)$$

### 6.4.4 Descriptive Statistics

For execution of the empirical design, the procedures, the nature of the data distribution is examined by using the standard descriptive statistics (mean, median, mode, standard deviation, variance, maximum and minimum values, skewness and kurtosis) first. Statistical techniques for analyzing time series range from relatively straightforward descriptive methods to sophisticated inferential techniques. Descriptive methods should generally be tried attempting more complicated procedures, because they can be vital in 'cleaning' the data, and then getting a 'feel' for them, before trying to generate ideas as regards a suitable model. Before doing anything, the analyst should make sure that the practical problem being tackled is properly understood. In other words, the context of a given problem is crucial in time-series analysis, as in all areas of statistics. If necessary, the analyst should ask questions so as to get appropriate background information and clarify the objectives. In particular, make sure that appropriate data have been, or will be, collected. If the series are too short, or the wrong variables have been measured, it may not be possible to solve the given problem. For Descriptive Techniques, the researcher may be expecting first to deal with summary statistics. Indeed, in most areas of statistics, a typical analysis begins by computing the sample mean (or median or mode) and the standard deviation (or inter quartile range) to measure 'location' and 'dispersion'. However, Time-series analysis is different. If a time series contains trend, seasonality or some other systematic component, the usual summary statistics can be seriously misleading and should not be calculated (Yang, 2009).

### 6.4.5 The Correlation Matrix

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) as follows:

$$R = \begin{bmatrix} 1 & r_{12} & r_{13}\ldots\ldots\ldots & r_{1k} \\ r_{21} & 1 & r_{23}\ldots\ldots\ldots & r_{2k} \\ \cdots & \cdots & \cdots & \cdots \\ r_{k1} & r_{k2} & r_{k3}\ldots\ldots\ldots & 1 \end{bmatrix} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \quad (6.4.5.1)$$

Where, the subscript 1, denotes the dependent variable Y ($r_{12}$ means correlation coefficient between Y and $X_2$ and so on) and where it 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 as well as with their different components at the disaggregated level are to be examined.

## 6.5 Stationarity and Non-stationarity of Data

### 6.5.1 Stationary Stochastic Processes

A stochastic process is said to be stationary if its mean and variance are constant over time and the value of the covariance between the two time periods depends only on the distance or gap or lag between the two time periods and not actual time at which the covariance is computed. In the time series literature, such a stochastic process is known as a weakly stationary, or covariance stationary, or second-order stationary, or wide sense, stochastic process.

To explain weak stationarity, let $y_t$ be a stochastic time series with these properties:

Mean: $E(Y_t) = \mu$ ……………………………………… (6.5.1.1)

Variance: $\text{var}(Y_t) = E(Y_t - \mu)^2 = \sigma^2$ …………………... (6.5.1.2)

Covariance: $\gamma_k = E[(Y_t - \mu)(Y_{t+k} - \mu)]$ …………………. (6.5.1.3)

Where, $\gamma_k$, the covariance at lag k, is the covariance between the values of $Y_t$ and $Y_{t+k}$, that is between two Y values k periods apart. If k=0, we obtain $\gamma_0$, which is simply the variance of Y ($\sigma^2$).

A time series is stricktly stationary, if all the moments of its probability distribution and not just the first two (i.e., mean and variance) are invariant over time. If however, the stationary process is normal, the weakly stationary stochastic process is also strictly stationary, for the normal stochastic process is fully specified by its two moments, the mean and the variance. In short, if a time series is stationary, its mean, variance and autocovariance (at various lags) remain the same no matter at what point we measure them; that is, they are time invariant. Such a time series will tend to return to its mean (called mean reversion) and fluctuations around this mean (measured by its variance) will have broadly constant amplitude (Gujarati, 2004. pp. 797-798). If the assumptions of classical regression model are not valid for a time series data is said to be non stationary. It may be upward or downward trend. In short, if a time series is stationary its mean, variance and auto covariance at various lags remain the same at any point of time. On the other hand, if they do not remain same the time series is called non-stationary. To explaining the stationarity considering the autoregressive model as;

$$Y_t = \phi Y_{t-1} + u_t; \quad t=1, 2\ldots, T \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6.5.1.4)$$

Where, $u_t$ is assumed to be an IID (0, $\sigma^2$). If $\phi < 1$, the series $Y_t$ will be stationary and if $\phi = 1$, the series is non- stationary. Any non- stationary time series can be converted into stationary by differencing in order. In this context how many numbers of differences are needed depend on the number of unit roots the series contains. Say, a series becomes stationary after differencing d times then it contains d units roots and is said to be integrated of order *d* denoted by *I (d)*. In equation (6.5.1.4), if $\phi = 1$, $Y_t$ has a unit root and $Y_t \approx$ I (1).

### 6.5.2 Spurious Regression

Regression involving time series data include the probability of obtaining spurious or dubious results in the sense that the results look good superficially but on further probing they look suspect. When one runs a regression of a non-stationary time series data on another non-stationary time series data, the estimated regression suffers from spurious results. In such a case, the standard “t” and “F” testing procedures are not valid. For instance, consider the following simple d. g. p:

$$Y_t = Y_{t-1} + u_t \; u_t \sim \text{IID } (0, \sigma^2) \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (6.5.2.1)$$

$$X_t = X_{t-1} + u_t \; u_t \sim \text{IID } (0, \sigma^2) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6.5.2.2)$$

That is, both $Y_t$ and $X_t$ are uncorrelated non stationary variables such that when the following regression model is estimated:

$$Y_t = \beta_0 + \beta_1 X_t + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \qquad (6.5.2.3)$$

It should generally be possible to accept the null hypothesis $H_0 : \beta_1 = 0$. However, because of the non-stationary nature of the data implying that $\varepsilon_t$ is also non-stationary any tendency for both time series to be growing leads to correlation, which is picked up by the regression model.

According to Granger and Newbold a good rule of thumb to suspect that the estimated regression is spurious is that the coefficient of determination $R^2$ must be greater than the value of Durbin Watson'*d*' statistic. That is, many non- stationary economic time series become stationary when they are differenced. But it is unfortunate, when the attention is concentrated on relationship between the levels of the variables will be lost. If consider the relationship as:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \qquad (6.5.2.4)$$

Where, $\varepsilon_t$ is a disturbance, then

$$Y_t - Y_{t-1} = \beta_1(X_{1t} - X_{1t-1}) + \beta_2(X_{2t} - X_{2t-1}) + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6.5.2.5)$$

Where, $u_t = \varepsilon_t - \varepsilon_{t-1}$. If it is estimated (6.5.2.5) instead of (6.5.2.4) it can be obtained no information about $\beta_0$. Equation (6.5.3.5) focuses purely on the short-run relationship between $Y_t$ and $X_t$. There is a further problem with a first differenced in the equation (6.5.2.5). If a relationship such as (6.5.2.4) really exists and if its disturbance $\varepsilon_t$ is non-autocorrelated, then the disturbance $u_t$ in equation (6.5.2.5) is simple moving average form and hence will be autocorrelated. First or second differencing then is an unsatisfactory method of dealing with a spurious correlation problem. This problem is that generally increase with the sample size and attempting to decrease the underlying series as would be possible with trend stationary data cannot solve it.

**6.6 Test of Stationarity / Unit Root Test of Time Series Data**

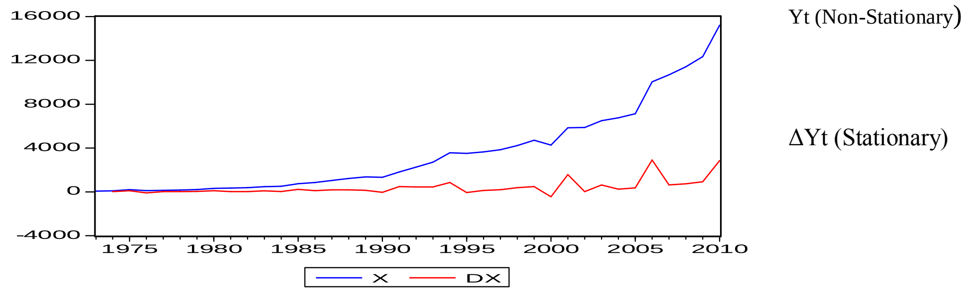
There are several tests of stationarity, of them the five tests have been discussed those are prominently applied in the literature. These are: (1) the graphical test; (2) the correlogram test; (3) the Augmented Dickey-Fuller test; (4) the D-F (GLS) test; and (5) the

Phillips-Perron test. The tests follow the calculation of $\tau$- statistics (Tau-statistics), which is used under the null hypothesis: $H_0 : \rho = 1$ against an alternative hypothesis $H_A : \rho \neq 1$. If $\rho = 1$, there exists unit root or the data is non-stationary. If the variable is differenced once and the differenced series becomes stationary, then it is integrated of order one i.e. *I (1)*. Similarly, if it is differenced twice and the differenced series becomes stationary, then it is integrated of order two [i.e. *I (2)*] and so on.

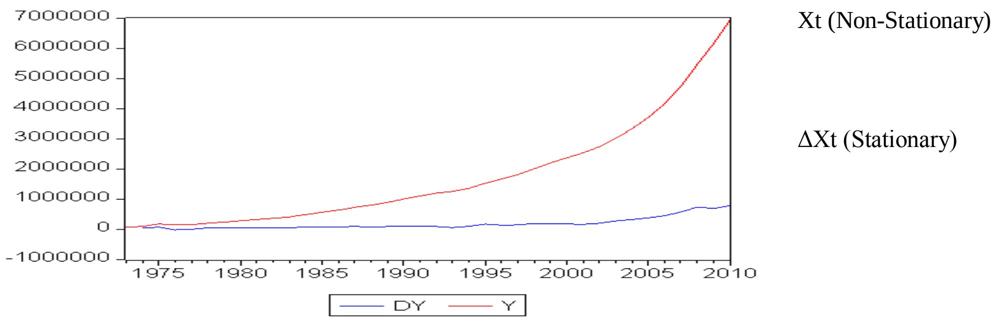
### 6.6.1 Graphical Representation of Time Series Data

To examine the stationarity of a time series data graphical representation system is famous one. For graphical representation the time series data is plotted in a graph, if the data shows a strong uptrend or downtrend, it can be taken a decision that the series is non-stationary. If the series seems to have a constant overall mean, then it can be taken a decision that the series is stationary. Following figures are the illustration of the stationarity of the data of a hypothetical series.

**Figure 6.6.1.1: Stationarity and Non-stationarity Time Series data**




**Figures 6.6.1.2: Plot a Time Series Based, on Stating Value of $Y_0 = 0$**




Where, $Y_t = Y_{t-1} + u_t$ and $X_t = X_{t-1} + u_t$ denote non-stationarity and $Y_t - Y_{t-1} = \Delta Y_t = u_t$ denote stationarity of data, where, $u_t \sim$ IID $(0, \sigma^2)$, the variance of $Y_t$ is increasing with time and there is no tendency for the series to revert to any mean value. But this tendency can be seen after it is differenced.

### 6.6.2 Correlogram Test

The non-stationarity of time series data can be tested by using autocorrelation function (ACF) based on the so-called the correlogram test. The ACF at lag *k*, denoted by $\rho_k$, is defined as:

$$\hat{\rho}_k = \frac{\gamma_k}{\gamma_0} = \frac{Co\,\text{var}\,iance}{Variance} = \frac{\sum(Y_t - \bar{Y})(Y_{t+k} - \bar{Y})}{n} = \frac{\sum(Y_t - \bar{Y})^2}{n} \quad \text{........ (6.6.2.1)}$$

Where, n is the sample size and $\bar{Y}$ is the sample mean. The statistical significance any $\hat{\rho}_k$ can be judged by standard error. Bartlett (1946) has shown that if a time series is purely random that is, if it exhibits white noise, the ample 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, then the hypothesis can be rejected that the true $\hat{\rho}_k$ is zero. If none of the estimated correlations lies in the interval, the estimated autocorrelation shown by the table will be statistically significant. Instead of assessing the statistical significance of an individual autocorrelation coefficient, it is better to find out the sum of autocorrelation coefficients squared is statistically significant. This can be done with the aid of the Q statistic developed by Box and Pierce as:

$$Q = n \sum_{k=1}^{m} \hat{\rho}_k^2 \quad \text{.................................... (6.6.2.2)}$$

Where, n is the sample size (42), and m is the total number of lags used in calculating ACF, 14 in the present study. The Q statistic is often used to test whether a time series is purely random or white noise. In large samples, Q is approximately distributed as the chi-square distribution with *mdf*. If the computed Q value in an application exceeds the critical Q value from the chi-square distribution at the chosen level of significance, the null hypothesis can be rejected that the all true $\hat{\rho}_k$ are zero; at least some of them must be nonzero (Gujarati, 2011).

### 6.6.3 Augmented Dickey- Fuller (ADF) Test

The augmented Dickey-Fuller test is used to examine the existence of unit roots and to 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. 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 is applied for testing stationary allowing the chance of autocorrelation of error term $u_t$. The ADF test requires modifying equation as follows:

$$\Delta Y_t = \delta_1 + \delta_2 t + \zeta Y_{Yt-1} + \theta \sum_{i=1}^{m} \Delta Y_{t-1} + u_t; \quad \text{i=1, 2......m.} \quad \ldots\ldots\ldots \quad (6.6.3.1)$$

Where, $u_t$ is assumed to be identical and independently distributed random variable. This ADF test involves adding an unknown number of lagged first differences of the dependent variable to capture autocorrelated omitted variables that would otherwise enter into the error term $u_t$. The numbers of lagged difference terms to be included are often determined empirically, the idea being to include enough terms, so that the error term in equation (6.6.3.1) is serially independent. This ADF test statistic checks the null hypothesis of stationary time series and has the same asymptotic distribution as the DF statistic, so the same critical values are used. If $\rho$ =0 (where, $\delta = \rho-1$) against the alternative $\rho < 0$ then $Y_t$ contains a unit root. To test this null hypothesis again ADF $\tau$ statistic should be calculated as:

$$\tau = \frac{\hat{\rho} - 1}{s.e(\hat{\rho})} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6.6.3.2)$$

It can be compared against the critical values in $\tau$ tables.

**Table 6.6.3.1: Critical Values for Dickey-Fuller and Augmented Dickey-Fuller Test**

| Sample size | Critical Values for τ | | | Critical Values for τ | | | Critical Values for τ | | |
|---|---|---|---|---|---|---|---|---|---|
| | Level of Significance | | | Level of Significance | | | Level of Significance | | |
| DF distributions | 0.01 | 0.05 | 0.10 | 0.01 | 0.05 | 0.10 | 0.01 | 0.05 | 0.10 |
| 25 | -2.66 | -1.95 | -1.60 | -3.75 | -3.00 | -2.63 | -4.38 | -3.60 | 3.24 |
| 50 | -2.62 | -1.95 | -1.61 | -3.58 | -2.93 | -2.60 | -4.15 | -3.50 | 3.18 |
| 100 | -2.60 | -1.95 | -1.61 | -3.51 | -2.89 | -2.58 | -4.04 | -3.45 | 3.15 |
| t distribution $t \rightarrow \infty$ | -2.33 | -1.65 | -1.28 | -2.33 | -1.65 | -1.28 | -2.33 | -1.65 | 3.28 |

Source: Fuller (1976)

Dividing the estimated $\zeta$ coefficient by its standard error to compute the Dickey-Fuller *t*-statistic and to refer to DF Table (6.6.3.1) to see if the null hypotheses $\zeta$ =0 is rejected (there is a unit root problem). If the computed absolute value of the *t* statistics is less than the absolute critical value the time series is considered to be non-stationary

(Gujarati, 1995, pp. 817-818). Moreover, choosing the correct form of the ADF model is problematic and using different lag – lengths often results in different outcomes with respect to rejecting the null hypothesis of non- stationary. Therefore, unit root tests with 40 or less observation are not likely to be very powerful and failure to reject the null hypotheses of a unit root does not mean that one can accept this hypothesis.

### 6.6.4 The D-F (GLS) Test

The test suggested by Elliott, Rothenberg, and Stock (1992) is as follows: Let $y_t$ the considered process. The D-F (GLS) *t*-test is performed by testing the hypothesis $a_0 = 0$ in the regression as:

$$\Delta y_t^d = \alpha_0 y_t^d + \alpha_1 \Delta y_{t-1}^d + ................ + \alpha_\rho \Delta y_{t-\rho}^d + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (6.6.4.1)$$

Where $y_t^d$ is locally de-trended series $y_t$. The local de-trending depends on whether we consider a model with drift only or a linear trend. The later is the most commonly used. In this case we have

$$y_t^d = y_t - \hat{\beta}_0 - \hat{\beta}_1 t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \quad (6.6.4.2)$$

Where, ($\hat{\beta}_0, \hat{\beta}_1$) are obtained by regressing $\bar{y}$ on $\bar{z}$. 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 other wise rejected and the data series 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)

### 6.6.5 Phillips-Perron (PP) Test

Phillips-Perron (1988) test is used to deal with serial correlation and heteroscedasticity. 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. Phillips and Perron use nonparametric statistical methods to take care of the serial correlation in the terms without adding lagged difference terms. The test detects the presence of a unit root in a series, say $Y_t$, by estimating:

$$\Delta Y_t = \alpha + \rho * Y_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6.6.5.1)$$

$$\Delta Y_t = \alpha + \beta t + \rho * Y_{t-1} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.............. \quad (6.6.5.2)$$

Where, the second equation includes a trend variable. 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.

**6.7 Cointegration Approach**

The concept of cointegration was introduced by Grabger (1981 and 1983) and the statistical analysis of cointegrated process was organized by Engle and Granger (1987). Cointegration means that despite being individually non-stationary, a linear combination of two or more time series can be stationary (Gujarati, 1998). When a linear combination of non- stationary variables is stationary, the variables are said to be cointegrated, and the vector that it is quite possible for a linear combination of integrated variables to be stationary. In this case, the variables are said to be cointegrated. In broadly speaking, cointegration refers to a linear combination of non-stationary variables while all variables must be integrated of the same order. If the information provides that the variables are integrated to different orders, or not at all, then the specification of the model should be reconsidered (Green, 1993). For a simple example, if a variable becomes stationary after differencing once, i.e. *I(1)*, then the error term originated from the cointegrating regression is stationary, i.e. *I(0)* (Hansen and Juselius,1995). Now considering the following cointegrating regression equation:

$$Y_t = \alpha + \beta X_t + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \quad (6.7.1)$$

If the series $Y_t$ and $X_t$ are *I(1)* and the error term $u_t$ is I (0). The coefficient, $\beta$ measures the equilibrium relationship between the series Y and X. the term $u_t$, indicates the derivation from the long run equilibrium path of $Y_t$ and $X_t$. When a time series ($Y_t$) is said to be integrated of order one, it is denoted by *I(1)*. Taking first difference of the time series leads to a stationary process. In the same way, if the original non-stationary series has to be differenced d times before it becomes stationary, the original series is integrated of order d, and it is denoted by *I(d)*. If original series, say, $Y_t$ and $X_t$ are integrated of order one *I(1),* as is frequently the case with economic variables (Nelson and Plosser, 1982).

**6.7.1 Test of Cointegration**

The basic idea behind cointegration is that if two or more series move together in the long run, even though the series themselves are trended, the difference between them is stationary, and it is possible to regard these series to have a long run equilibrium relationship. When a linear combination of non- stationary variables is stationary, the variables are said to be cointegrated, and the vector that it is quite possible for a linear combination of integrated variables to be stationary. In this case, the variables are said to be cointegrated. There are two methods which are widely used to test for cointegration: i) Full Information Maximum Likelihood Method (Johansen 1988, Johansen and Juselius, 1990); and ii) Augmented Engle-Granger (AEG) Causality test.

### 6.7.2 The Johansen Cointegration Method (Maximum Likelihood Method)

Johansen (1988) suggests a maximum likelihood procedure to obtain cointegrating vectors and speed of adjustment coefficient identifying the number of cointegration vectors within the vectors within Autoregressive (VAR) model. To identify the number of cointegration vectors, a likelihood ratio test of hypothesis is used. This procedure allows the estimation of all possible cointegrating relationships and develops a set of statistical tests to check the hypothesis about how many cointegrating vectors exist in the framework.

The following Vector Autogressive (VAR) model is the basis of multivariate cointegration of Johansen Maximum Likelihood approach:

$$Z_t = A_1 Z_{t-1} + \ldots\ldots\ldots\ldots + A_k Z_{t-k} + u_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \quad (6.7.2.1)$$

Here, $Z_t$ is an (n x 1) vector of I (1) variables including both endogenous and exogenous variables. $A_i$ is an (n x n) matrix of parameters, $u_t$ is (n x 1) vector of white noise errors. The equation (8.8.3.1.1) can be estimated by OLS because each variable 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 (6.7.2.1) in its first difference or error correction form as:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \ldots\ldots\ldots\ldots\ldots + \Gamma_{k-1} \Delta Z_{tt-k+1} + \Pi Z_{t-k} + u_t \quad \ldots\ldots\ldots. \quad (6.7.2.2)$$

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

The specification (8.8.3.1.2) provides information about the short run and long run adjustments to the changes in $Z_t$ by estimating $\Gamma$ and $\Pi$ respectively. Equation (6.7.2.2) differs from the standard first difference form of the VAR model by only the inclusion of the term $\Pi$ $Z_{t-k}$. 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 $\Pi$ . If the rank of the $\Pi$ 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 $\Pi$ = α β, 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 maximum likelihood estimates of β can be estimated as the Eigen Vector and the related Eigen values are obtained by solving the following equation:

$$| \lambda S_{kk} - S_{k0} S_{00}^{-1} S_{0k} |= 0 \qquad \text{...........................................} \quad (6.7.2.3)$$

Where $S_{00}$ is the residual matrix obtained by regressing on its differences, i.e., $\Delta X_{t-1}.........,\Delta X_{t-k+1}, S_{kk}$ is the residual matrix obtained by regressing $X_{t-k}$ on its lagged differences, i.e. $\Delta X_{t-k+1}, S_{k0}$ are cross products of residual matrices $S_{k0}$ and $S_{ok}$ .

Some variables in the model which are *I(0)* and are insignificant in the long- run cointegrating space but affect the short run model; equation (6.7.2.2) can be rewritten as:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Pi Z_{t-k} + \varphi D_t + u_t \quad \text{...................................} \quad (6.7.2.4)$$

Here $D_t$ indicates the *I* (0) variables. These are frequently included to take account of short run shocks and treated as policy intervening variables. In the model these variables are typically included as dummy variables. Two Likelihood Ratios (LR) tests are formulated for detecting the presence of cointegrating vector. The cointegrating rank of the above matrices *r,* can be formally tested with maximum eigen value test (λ max) and the trace test (λ trace).

### 6.7.2.1 Trace Test Statistics

The first one is trace statistics as;

$$\lambda_{trace} = -2 \ln Q = T \sum_{i=1}^{m} \ln(1 - \lambda_j) \quad \text{.................................} \quad (6.7.2.1.1)$$

The statistics tests the null hypothesis of at most r cointegrating vectors against the alternative hypothesis of greater than *r*.

### 6.7.2.2 Maximum Eigen Value Test (Max-eigen Value Test)

The second one is the maximum Eigen value test which is given below;

$$\lambda_{trace} = -2 \ln(Q : r \mid r+1) = -T \ln(1 - \lambda_{r+1}) \quad \text{..............} \quad (6.7.2.2.1)$$

This is the test of the null hypothesis of *r* cointegrating vectors against the alternative hypothesis over vectors or r+1. Monte Carlo has derived the critical values for these tests, simulated and tabulated by Johansen (1988) and Osterwald- Lenum (1992).

Testing cointegration using a single equation is problematic. If there are *n>2* variables in the model, there can be more than one cointegrating vector. If these are not weakly exogenous, the single equation approach can be misleading, particularly if more than cointegration relationship is present. It is possible for up to *n-1* linearly independent cointegration vectors to exist and only when *n = 2;* it is possible to show that the cointegration vector is unique. If single equation methods were to be used, it would seem that the unrestricted dynamic modeling approach is most likely to produce unbiased estimates of the long relationship, with appropriate *t* and *F* statistics.

### 6.8 Ordinary Least Squares (OLS) Method

The method of ordinary least squares is attributed to Carl Friedrich Gauss, a German mathematician. Under certain assumptions, the method of least squares has some very attractive statistical properties that have made it one of the powerful and popular methods of regression analysis. To understand this method, the two variable regresson model in the sample form for instance is:

SRF: $Y_i = \hat{\beta}_1 + \hat{\beta}_2 X_i + \hat{u}_i$ …………………….……………… (6.8.1)

That is, $Y_i = \hat{Y} + \hat{u}_i$ and $\hat{u}_i = Y_i - \hat{Y}_i$

Where, $\hat{Y}_i$ is the estimated (conditional mean) value of $Y_t$ and $\hat{u}_i$ (the residuals) are simply the differences between the actual and estimated Y values. Let us suppose, to choose the SRF in such a way that the sum of the residuals $\sum \hat{u}_i = \sum (Y_i - \hat{Y}_i)$ is as small as possible. But the algebraic sum of these residuals is zero. Thus the squared sum of the residuals is:

$\sum (\hat{u}_i)^2 = \sum (Y_i - \hat{\beta}_1 - \hat{\beta}_2 X_i)^2$ ……………………………..….. (6.8.2)

By minimizing this residuals squares with the formulae of first difference equal to zero and the second difference of the residuals squared function is positive. This is a straight forward-forward exercise in differential calculus that yields the following equations for estimating $\hat{\beta}_1$ and $\hat{\beta}_2$. Solving the normal equations simultaneously, it is obtained that

$$\hat{\beta}_1 = \frac{\sum X_i^2 \sum Y_i - \sum X_i \sum X_i Y_i}{n\sum X_i^2 - (\sum X_i)^2} \text{ and } \hat{\beta}_1 = \hat{Y} - \hat{\beta}_2 \overline{X} \text{ …………… (6.8.3)}$$

The last equation can be obtained directly from the equation $\sum Y_i = n\hat{\beta}_1 + \hat{\beta}_2 \sum X_i$ by simple algebraic manipulations (Gujarati, 1995, pp- 55-56). In case of multiple regressions or the K variable regression model the ordinary least squares (OLS) method can be depicted as:

$$Y_i = \hat{\beta}_1 + \hat{\beta}_2 X_{2i} + \hat{\beta}_3 X_{3i} + .......... + \hat{\beta}_k X_{ki} + \hat{u}_i \text{ …………………… (6.8.4)}$$

That can be written more compactly in matrix notation as:

$$y = X\hat{\beta} + \hat{u} \text{ ……………………………………………………… (6.8.5)}$$

Where, $\hat{\beta}$ is a *K*- element column vector of the OLS estimators of the regression coefficients and where $\hat{u}_i$ is an $n \times 1$ 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

$$\sum u_i^2 = \sum (Y_i - \hat{\beta}_1 - \hat{\beta}_2 X_{2i} - ........... - \hat{\beta}_k X_{ki})^2 \text{ …………………… (6.8.6)}$$

Where, $\sum \hat{u}_i^2$ is the residual sum of squares (RSS) that gives $\hat{u} = y - X\hat{\beta}$

Therefore, $\hat{u}'\hat{u} = (y - X\hat{\beta})'(y - X\hat{\beta})$

$$= y'y - 2\hat{\beta}'X'y + \hat{\beta}'X'X\hat{\beta} \text{ ………………………… …. (6.8.7)}$$

Where, use is made of the properties of the transpose of a matrix, namely, $(X\hat{\beta})' = \hat{\beta}'X'y$ and $\hat{\beta}'X'y$ is a scalar (a real number), it is equal to its transpose $y'X\hat{\beta}$ (Gujarati, 2003). More compactly that can be written in matrix form as:

$$(X'X)\hat{\beta} = X'y \text{ …………………………………………….. (6.8.8)}$$

Note these features of the ($X^{/}X$) matrix: Now using matrix algebra, if the inverse of ($X^{/}X$) exists, say, $(X^{/}X)^{-1}$, then pre-multiplying both sides of the above equations by this inverse is obtained $(X'X)^{-1}(X'X)\hat{\beta} = (X'X)^{-1}X'y$

Thus, by simple calculation,

$$\hat{\beta} = (X'X)^{-1}X'y \text{ …………………………………... (6.8.9)}$$

Where, $(X'X)^{-1}(X'X) = I$ is an identity matrix of order $(k \times k)$. Equation (6.8.9) 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).

### 6.8.1 The Wald Test

In the multiple regression models to test the hypothesis $\beta_i = 0$; we use this test statistics with the corresponding partial $r^2$ substituted in the place of the simple $r^2$. The test statistics has a $\chi^2$ distribution with *d. f. 1*. To test hypothesis such as: $\beta_1 = \beta_2 = ...... = \beta_k = 0$

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 $\chi^2$ distribution with d. f. k. To test the linear restrictions the Wald test is given as:

$$W = \frac{RRSS - URSS}{RRSS/n} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (6.8.1.1)$$

Where, RRSS = restricted residual sum of squares

URSS = unrestricted residual sum of squares

The Wald test has a $\chi^2$-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).

## 6.9 Error Correction Mechanism (ECM)

Granger (1983) and Engle and Granger (1987) have demonstrated that if $Y_t$ (GDP) and $X_t$ (Foreign Direct Investment) for example, are integrated of order one *I(1)* the Error Correction Model (ECM) exists. Those variables bear in equilibrium or steady state situation, the following relationship to each other exists:

$$\Delta \ln gdp_t = \beta_1 + \sum_{t=1}^{m} \beta_2 \Delta \ln gdp_{t-1} + \sum_{t=0}^{n} \beta_3 \Delta \ln fdi_{t-1} + \alpha_1 \Delta ECT_{t-1} + \varepsilon_{1t} \quad \cdots\cdots\cdots \quad (6.9.1)$$

$$\Delta \ln fdi_t = \gamma_1 + \sum_{t=1}^{p} \gamma_2 \Delta \ln fdi_{t-1} + \sum \gamma_3 \Delta \ln gdp_{t-1} + \alpha_2 \Delta ECT_{t-1} + \varepsilon_{2t} \quad \cdots\cdots\ldots \quad (6.9.2)$$

Where, $\ln gdp_t$ and $\ln fdi_t$ denote Gross Domestic Product and Foreign Direct Investment respectively and $ECT_{t-1}$ is the error correction term which is the lagged residual series of the cointegrating vector. $\Delta$ denotes the first difference. The $\varepsilon_{t-1}$ term denotes error correction, *m, n, p* and *q* denote the number of the lag lengths. The negative and statistically significant coefficients of the error correction terms suggest that there is a short run adjustment process working behind the long run equilibrium relationship between

Gross Domestic Product and Foreign Direct Investment. The parameters $\alpha_1$ and $\alpha_2$ are the speed of adjustment (in case of short run imbalances) in bringing about the equilibrium that is, removing the deviation. If two variables, like Gross Domestic Product and Foreign Direct Investment, are cointegrated, an error correction representation would be a more appropriate modeling strategy to capture short run and long run dynamics in the model (Gujarati, 1998, p. 825).

### 6.9.1 Vector Error Correction Modeling (VECM)

The purpose of VECM model is to indicate the speed of adjustment from the short run equilibrium to the long run equilibrium state. The greater the coefficient of the parameter, the higher is the speed of adjustment of the model from the short run to the long run. The VECM model for this study is specified as follows:

$$\Delta \ln gdp_t = c + \lambda e_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta \ln l_{t-i} + \sum_{i=1}^{m} \beta_i \Delta \ln di_{t-i} + \sum_{i=1}^{k} \Omega_i \Delta \ln gdp_{t-i} + \sum_{i=1}^{r} \delta_i \Delta \ln fdi_{t-i} + \sum_{i=1}^{o} \phi_i \Delta \ln to_{t-i} + \varepsilon_t \quad (6.9.1.1)$$

In the specification, the variables are cointegrated if the parameter ($\lambda$) of the error correction term is negative and statistically significant in terms of its associated- *t* value. This indicates unidirectional long run causal flows from changes in FDI, and openness to real GDP changes in Bangladesh as well as long run convergence. In case of $\lambda$ being positive and statistically significant, still there exists a long run causality but with a divergence.

## 6.10 Vector Autoregressive (VAR) Method

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 and the lagged values of all other endogenous variables in the model: usually, there are no exogenous variables in the model. In such models, some variables are treated as endogenous and some as exogenous or predetermined (exogenous plus lagged endogenous). This decision is often subjective and has been severely criticized by Cristopher Sims. He says if there is true simultaneity among a set of variables, they should all be treated on an equal footing: there should not by any a priori distinction between endogenous and exogenous variables. It is in this spirit of Sims' VAR model. The seeds of this model are shown in the Granger causality test. The Granger causality test assumes that the information relevant to the prediction of the respective variables, GDP and FDI, is contained solely in the time series data on those variables. The test involves estimating the following regressions:

$$\ln gdp_t = \sum_{i=1}^{n} \alpha_i \ln fdi_{t-i} + \sum_{j=1}^{n} \beta_j \ln gdp_{t-j} + u_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots (6.10.1)$$

$$\ln fdi_t = \sum_{i=1}^{m} \lambda_i \ln fdi_{t-i} + \sum_{j=1}^{m} \delta_j \ln gdp_{t-j} + u_{2t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6.10.2)$$

Where, it is assumed that the disturbances $u_{1t}$ and $u_{2t}$ are uncorrelated. The first equation postulates that current ln*gdp* is related to past values of *GDP* itself as well as of FDI, and the second equation postulates a similar behavior for $lnfdi_t$. It is essentially, treated that GDP and foreign direct investment 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).

**6.11 The Augmented Eangle-Granger (AEG) Causality Test**

The regression analysis requires one variable to be specified as a dependent variable while other variable as independent but it does not necessarily imply causation rather it may imply only association where the direction of causation will not be known. Granger (1969) 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. This means that there is Granger causality between two variables $Y_t$ and $X_t$, for instance. If a forecast on $Y_t$ taken from a set of information that includes the past variability of $X_t$, is better than a forecast that ignores the past variability, Granger causality remains between two variables $Y_t$ and $X_t$, with the assumption that other variables stay unchanged. The cause and effect relationship between two variables $Y_t$ and $X_t$, can be determined by the following equations:

$$y_t = \sum_{i=1}^{m} \alpha_{1i} x_{t-i} + \sum_{j=1}^{n} \alpha_{2j} y_{t-j} + u_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots.. \ldots\ldots\ldots\ldots.. (6.11.1)$$

$$x_t = \sum_{i=1}^{m} \beta_{1i} x_{t-i} + \sum_{j=1}^{n} \beta_{2j} y_{t-j} + u_{2t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \ldots\ldots\ldots\ldots\ldots (6.11.2)$$

Here, it is necessary to mention that $X_t$ Granger cause $Y_t$ does not mean that $Y_t$ is the effect of $X_t$. Granger causality is used to measure precedence of one variable to another.

The F statistics are the Wald statistics for the joint hypothesis, no causal relationship this means that, the null hypothesis is that $X_t$ does not Granger cause $Y_t$ in the first regression and that $Y_t$ does not Granger cause $X_t$ in the second regression.

If the variables are cointegrated and long run relationship exists, the next step is to apply the Granger Causality test. In order to obtain the estimated residuals $\epsilon_t$, the Granger causality models with a dynamic error correction of the GDP growth function for Bangladesh are as follows:

$$\Delta \ln gdp_t = c + \lambda e_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta \ln l_{t-i} + \sum_{i=1}^{m} \beta_i \Delta \ln di_{t-i} + \sum_{i=1}^{k} \Omega_i \Delta \ln gdp_{t-i} + \sum_{i=1}^{r} \delta_i \Delta \ln fdi_{t-i} + \sum_{i=1}^{o} \phi_i \Delta \ln to_{t-i} + \varepsilon_t \qquad (6.11.3)$$

$$\Delta \ln l_t = c + \lambda e_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta \ln l_{t-i} + \sum_{i=1}^{m} \beta_i \Delta \ln di_{t-i} + \sum_{i=1}^{k} \Omega_i \Delta \ln gdp_{t-i} + \sum_{i=1}^{r} \delta_i \Delta \ln fdi_{t-i} + \sum_{i=1}^{o} \phi_i \Delta \ln to_{t-i} + \varepsilon_t \qquad (6.11.4)$$

$$\Delta \ln di_t = c + \lambda e_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta \ln l_{t-i} + \sum_{i=1}^{m} \beta_i \Delta \ln di_{t-i} + \sum_{i=1}^{k} \Omega_i \Delta \ln gdp_{t-i} + \sum_{i=1}^{r} \delta_i \Delta \ln fdi_{t-i} + \sum_{i=1}^{o} \phi_i \Delta \ln to_{t-i} + \varepsilon_t \qquad (6.11.5)$$

$$\Delta \ln fdi_t = c + \lambda e_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta \ln l_{t-i} + \sum_{i=1}^{m} \beta_i \Delta \ln di_{t-i} + \sum_{i=1}^{k} \Omega_i \Delta \ln gdp_{t-i} + \sum_{i=1}^{r} \delta_i \Delta \ln fdi_{t-i} + \sum_{i=1}^{o} \phi_i \Delta \ln to_{t-i} + \varepsilon_t \qquad (6.11.6)$$

$$\Delta \ln to_t = c + \lambda e_{t-i} + \sum_{i=1}^{n} \alpha_i \Delta \ln l_{t-i} + \sum_{i=1}^{m} \beta_i \Delta \ln di_{t-i} + \sum_{i=1}^{k} \Omega_i \Delta \ln gdp_{t-i} + \sum_{i=1}^{r} \delta_i \Delta \ln fdi_{t-i} + \sum_{i=1}^{o} \phi_i \Delta \ln to_{t-i} + \varepsilon_t \qquad (6.11.7)$$

Where, $\Delta$ indicates the difference operator, $\epsilon$ implies nonzero serially independent random error terms, and $\lambda_{t-i}$ is the lagged error correction term obtained from the long run cointegrating relations between the variables. A significant coefficient of the error-correction term implies that the past errors affect the current value of the variables under consideration and it represents the long run causality. The short run causality can be captured by the variables with difference terms. FDI will cause growth in the short run if the difference terms variables of FDI are jointly significant (Gujarati, 2012).

### 6.12 Impulse Response Analysis (IRA)

Just as an autoregression has a moving average representation, a vector autoregression can be written as a vector moving average (VMA). The following equation:

$$x_t = \mu + \sum_{i=0}^{\alpha} A^i{}_1 e_{i-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(6.12.1)}$$

Where, $\mu = (\overline{yz})^i$ and the unconditional mean of $x_i$ is $\mu$. 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. The two variable VAR expressions in matrix form for instance is

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(6.12.2)}$$

Or using equation (6.12.1), the moving average representation of can be rewritten in terms of the ($e_{yt}$ and $e_{zt}$) sequences:

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\alpha} \begin{bmatrix} \phi_{11}(i) & \phi_{12}(i) \\ \phi_{21}(i) & \phi_{22}(i) \end{bmatrix} \begin{bmatrix} e_{yt-i} \\ e_{zt-i} \end{bmatrix}; \text{ or more compactly,}$$

$$x_t = \mu + \sum_{i=0}^{\alpha} \phi_i \varepsilon_{t-i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(6.12.3)}$$

The coefficients of $\phi_t$ can be used to generate the effects of $e_{yt}$ and $e_t$ shocks on the entire time paths of the $y_t$ and $z_t$ sequences. The four sets of coefficients $\phi_{11}(i)$, $\phi_{12}(i)$, $\phi_{21}(i)$ and $\phi_{22}(i)$ are called the impulse response functions (IRF). Plotting the impulse resoponse function is a practical way to visually represent the behviour of the $y_t$ and $z_t$ sereisin response to the various shocks (Enders, 2003, pp. 272-276). Impulse response analysis (IRA) is performed in this study by giving a shock of one standard deviation ($\pm$ 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. It is carried out in the study for analyzing shocks of the model.

## 6.13 Variance Decomposition Analysis

At the end, a variance decomposition analysis is conducted to gain additional insights. The variance decomposition analysis reveales 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 as well as of their respective factors in the disaggregated level. 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.

## 6.14 Model Diagnostic Test for the Study

### 6.14.1 Test of Autocorrelation of the Time Series Data

The term autocorrelation may be defined as correlation between members of series of observations ordered in time (as in time series data) or space (as in cross sectional data). In the regression context, the classical linear regression model assumes that such autocorrelation does not exist in the disturbances

$$E(u_i u_j) = 0 \text{ ; Where, } i \neq j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \ldots\ldots\ldots\ldots.. \quad (6.14.1)$$

Put simply, the classical model assumes that the disturbance term relating to any observation is not influenced by the disturbance term relating to any other observation (Gujrati, 2012, pp. 442-443). However, if there is such dependence, there is autocorrelation. Symbolically,

$$E(u_i u_j) \neq 0 \text{ ; Where, } i \neq j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6.14.2)$$

It should also be noted that autocorrelation can be positive as well as negative, although most economic time series generally exhibit positive autocorrelation because most of them either move upward or downward over extended time periods and do not exhibit a constant up-and-down movement. Autocorrelation or serial-correlation refers to the case in which the error term in one time period is correlated with the error term in any other time period. 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.

### 6.14.2 Detecting and Correcting Autocorrelation Problem

#### 6.14.2.1 Durbin Watson *d* Statistic

The most celebrated test for detecting serial correlation is that developed by statisticians Durbin-Watson. It is popularly known as the Durbin-Watson *d* statistic. The Durbin-Watson d statistic is specified as:

$$d = \sum_{t-2}^{n} (e_t - e_{t-1})^2 \Big/ \sum_{t-1}^{n} e_t^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \quad (6.14.2.1.1)$$

The presence of first-order autocorrlation is tested by utilizing the table of the Durbin-Watson statistic at the 5 or 1% levels of significance for *n* observations and *k* explanatory variables. If the calculated value of *d* from Eq. (6.14.2.1.1); where, the error term $u_t$ follows the $\rho$th order autoregressive$AR(\rho)$ schemes as follows:

$(u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + ------ + \rho_\rho u_{t-\rho} + \varepsilon_t)$ is smaller than the tabular value of $d_L$ (lower limit), the hypothesis of positive first-order autocorrelation is accepted. The hypothesis is rejected if $d>d_U$ (upper limit), and the test is inconclusive if $d_L<d<d_U$. This is routinely given by most computer programs such as Eviews. The calculated value of *d* ranges between 0 and 4, with no autocorrelation when d is in the neighborhood of 2. The values of d indicating the presence or absence of positive or negative first-order autocorrelation, and for which the test is inconclusive.

#### 6.14.2.2 The Lagrange Multiplier (L-M) Autocorrelation Test

In the multiple regression models to test the hypothesis $\beta_i = 0$ we use this test statistics with the corresponding partial $r^2$ substituted in the place of the simple $r^2$. The test statistics has a $\chi^2$ distribution with *d. f. 1*. To test hypothesis such as: $\beta_1 = \beta_2 = ...... = \beta_k = 0$

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 $\chi^2$ distribution with *d.f. k*. To test the linear restrictions the L-M test is given as:

$$LM = \frac{RRSS - URSS}{RRSS/n} \quad \text{.............................................} \quad (6.14.2.2.1)$$

Where, RRSS = restricted residual sum of squares

URSS = unrestricted residual sum of squares

The L-M test like Wald test has a $\chi^2$-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).

#### 6.14.2.3 Breusch-Godfrey Serial Correlation Test

To avoid some of the pitfalls of the Durbin-Watson d test of autocorrelation, statisticians Breusch and Godfrey have developed a test of autocorrelation that is general in the sense that it allows for i) non-stochastic regressors, such as the lagged values of the regressand; ii) higher-order autoregressive schemes, such as *AR(1), AR(2),* etc.; and iii) simple or higher-order moving averages of white noise error terms. Without going into the mathematical details which can be obtained from the references, the B-G test. Let the following regression model:

$$Y_t = \beta_1 + \beta_2 X_t + u_t \quad \text{....................................} \quad (6.14.2.3.1)$$

Assume that the error term $u_t$ follows the $\rho$th order autoregressive, *AR(*$\rho$*)* schemes as follows: $u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + ------- + \rho_\rho u_{t-\rho} + \varepsilon_t$ ........... (6.14.2.3.2)

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. It is available for residuals from OLS, and the original regression may include autoregressive (AR) terms. Unlike the Durbin-Watson test, the Breusch- Godfrey test may be used to test for serial correlation beyond the first order, and is valid in the presence of lagged dependent variables. The null hypothesis of the Breusch-Godfrey test is that there is no serial autocorrelation up to the specified number of lags. The number of observations multiplied by $R^2$ is the Breusch-Godfrey test statistic.

### 6.14.3 The White General Heteroscedasticity Test

To give some idea about White's heteroscedasticity corrected standard errors, the variances of $\hat{\beta}_2$ of two variable regression model are:

$$\text{var}(\hat{\beta}_2) = \frac{\sum x^2{}_i \sigma_i{}^2}{(\sum x^2{}_i)^2} \quad \text{.................................. .......... (6.14.3.1)}$$

Since $\sigma^2{}_i$ 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). In case of multiple regression models, the variance of any partial coefficient is obtained as:

$$\text{var}(\hat{\beta}_i) = \frac{\sum \hat{w}^2{}_{ji} \hat{u}_i{}^2}{(\sum \hat{w}^2{}_{ji})^2} \quad \text{.............................................. (6.14.3.2)}$$

Where, $\hat{u}_i$ are the residuals obtained from the *k* variable regression (Gujarati, 2012, pp. 439-440).

### 6.14.4 The CUSUM and CUSUMSQ Tests

CUSUM and CUSUMSQ tests are to be applied to obtain whether the data set have structurally broken or not. The tests are easy to use and are found to perform quite well in a Monte Carlo experiment. 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 the post estimation test of the model. By applying these tests in the data series, the results will be more reliable and robust. 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. The limit distribution of the test is derived under both the null and the alternative hypothesis. At the same time, the CUSUMSQ test examines the stability of the econometric models used in the study. If the line remains inside the 0.95 confidence level the model of the study is stable otherwise it may be instable.

### 6.15 Conclusion

In order to fulfillment of the objectives of the study and to test the hypotheses the improved econometric analytical techniques with up to date available data have been carried out through this chapter. The data, the analytical framework of the study, the estimable functions of the study and the overall econometric analytical procedures have been discussed theoretically in this chapter. In this study, the economic growth (stated as GDP) is considered as dependent variable. In contrast, stock of labour force, domestic investment (proxy of gross capital formation), FDI and trade openness have been considered as the explanatory variables. At the disaggregated level, domestic investment, FDI and trade openness in Bangladesh have been further considered as the dependent variables in their respective functions. In econometric analysis, the normality of the distribution has been tested by invoking the Jarque-Bera test. For the pre-estimation of the model the Chow structural breakpoint test and Coppock Instability Index have also been carried out. The staionarity of the data has been justified by the correlogram test, the ADF test, the D-F (GLS) and the Phillips-Perron test. For testing cointegration of the variables of the functions, the Johansen Maximum likelihood method, OLS method for the estimation of the functions, VECM for short and long run causality, VAR for short and long run elasticity, AGC test for short run causal relationships have been empirically examined throughout this chapter. Besides the IRA and variance decomposition as well as the model diagnostic tests have also been analyzed in this chapter. That is, a complete structure of econometric analysis has been carried out through this chapter that would make the findings perfect and make the study enriched.

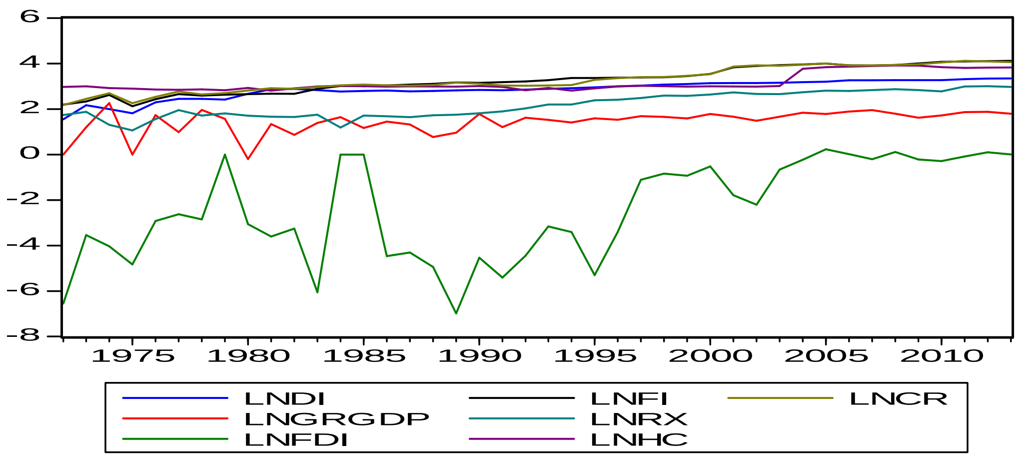
## Chapter Seven: Empirical Results of Domestic Investment Function

### 7. Introduction

One of the important objectives of this study is to assess the influences of different components on domestic investment on it in Bangladesh and to examine the causal relationships associated with them. In this context, the domestic investment function has been estimated and the concerned hypotheses have been tested throughout this chapter. In doing so, the stability of the model and structural break point, the statistical description of the domestic investment function, the correlation matrix, the normality of the time series data, have been examined first. The stationarity of the data, the long run cointegrated relationships have also been justified so that the function could be estimated to assess the impact of the factors on domestic investment. The short and long run elasticities, the causal relationships associated with the factors and the response of domestic investment to the factors have also been examined throughout this chapter. Besides, various post estimation model diagnostic tests have also been carried out. In analyzing the econometric results, the popular econometric software Eviews 5.1 has been performed.

### 7.1 Trend of the Variables of Domestic Investment Function

**Figure 7.1.1 Trend of Variables of the Domestic Investment Function for Bangladesh**




Source: Table 7.1.1 (in Appendix) and the Figure is drawn with Eviews- 5.1.

Figure 7.1.1 shows that each of the variables has the upward trend over the period but the slopes of them are different. The trend of domestic investment is steady upward but it is not as expected. The trend is very slow with some fluctuations. After 1990, domestic investment rises steadily in Bangladesh. GDP growth rate line shows that there are very much fluctuated slopes of the curve indicating there is ups and down in growth rate of GDP in Bangladesh. The fluctuations are significantly reducing after 1990 and remaining 5.00 to 6.5% in each year. The variable FDI has also a positive but very much fluctuated slope for Bangladesh. The financial intermediation has more or less fresh upward rising trend in Bangladesh over the period. The real export of Bangladesh is steady increasing trend with very slow upward slope but it falls drastically in 1975 and 1984 due to political unrest and some other reasons. The human capital in Bangladesh was very much stagnant up to 2000 without a remarkable development but it vertically jumps up and rises significantly with compulsory primary education for all and stipend school enrolment policies. After 2007, it again falls but steady. The domestic credit availability is freshly increased continuously with little fluctuations over the years but it affects negatively at the initial stage after independence of Bangladesh. The nature and pattern of variables of domestic investment function are however positive and upward trends over the years in Bangladesh.

## 7.2 Structural Changes of Domestic Investment in Bangladesh

### 7.2.1 Result of the Chow Test

The Chow test is conducted to measure the structural changes in the aggregate domestic investment in Bangladesh. It is the pre-estimation method checking model stability. The results of the Chow test are shown by the Table below:

**Table 7.2.1.1: Results of the Structural Breakpoint Chow Test**

| Chow Breakpoint Test:1990 | | | |
|---|---|---|---|
| F- Statistic | 14.19 | Prob: F(2,42) | 0.00 |
| Log Likelihood Ratio | 63.60 | Prob: Chi-square (2) | 0.00 |

Source: Estimated from the Table 7.1.1 (in Appendix). The Test is performed with Eviews 5.1.

Table 7.2.1.1 shows the results that there exists no structural breakpoint in 1990 in the series of domestic investment during the study period. Since, the calculated F-statistic (14.19) is greater than the F-critical value and it is also confirmed by the p-value equals to 0.0000 which is lower than any significance levels ($\alpha$). This indicates that the null hypothesis is significant and there is no structural breakpoint of domestic investment in Bangladesh in 1990. Though, this year is the turning point of trade liberalization in Bangladesh and the country was moving to the free market economy with taking the hand of globalization after establishment of World Trade Organization (WTO). The year 1990 was also politically important for Bangladesh because it turned into the democracy after a long struggle against military autocracy. The investment pace was yet remain almost same. Hence, there is no structural breaking point of domestic investment in 1990 in Bangladesh.

### 7.2.2 Result of the Coppock Instability Index

The instability of domestic investment of Bangladesh is estimated by using Coppock Instability Index. A detail procedure of the Coppock Instability Index is mentioned in the Methodology Chapter. The higher value of the Coppock Instability Index indicates the higher degree of instability.

**Table 7.2.2.1: Coppock Instability Index of Domestic Investment of Bangladesh**

| Period | Coppock Instability Index (CII) in % |
|---|---|
| Pre-Liberalization | 16.5 |
| Post-Liberalization | 14.9 |
| Overall | 13.7 |

Source: Own estimated from the data of the Table 7.1.1 in Appendix.

Note: CII= [Antilog $\sqrt{Variance - 1}$ ]*100.

Table 7.2.2.1 shows that the CII is 16.5 percent during the pre-liberalization regime and 14.9 percent during the post-liberalization regime. Therefore, it is clear indication that the instability in domestic investment is higher during pre-liberalization than post-liberalization periods. The CII of post liberalization period is also higher than that of the overall study period (13.7 percent).

### 7.2.3 Descriptive Statistics of Domestic Investment Function

**Table 7.2.3.1: Results of the Descriptive Statistics of the DI Function**

| | Lndi | lngrgdp | lnfdi | Lnfi | lnrx | lnhc | Lncr |
|---|---|---|---|---|---|---|---|
| Mean | 2.8542 | 1.4454 | -2.4360 | 3.2693 | 2.1752 | 3.1593 | 3.2756 |
| Median | 2.8839 | 1.6058 | -2.7369 | 3.2398 | 2.1119 | 2.9922 | 3.0904 |
| Maximum | 3.3460 | 2.2609 | 0.2324 | 4.1164 | 3.0038 | 3.9143 | 4.1155 |
| Minimum | 1.5471 | -0.1995 | -6.9866 | 2.1227 | 1.0630 | 2.8049 | 2.1732 |
| Std. Dev. | 0.4179 | 0.5263 | 2.1718 | 0.5866 | 0.5552 | 0.3947 | 0.5535 |
| Skewness | -1.2942 | -1.6656 | -0.3130 | -0.1284 | -0.0689 | 1.1567 | 0.0235 |
| Kurtosis | 4.4207 | 5.6302 | 1.8581 | 1.9241 | 1.7348 | 2.4915 | 1.9434 |
| Jarque-Bera | 15.256 | 31.5260 | 2.9677 | 2.1413 | 2.8344 | 9.8186 | 1.9577 |
| Probability | 0.0005 | 0.0000 | 0.2268 | 0.3428 | 0.2424 | 0.0074 | 0.3757 |
| Sum | 119.8773 | 60.7058 | -102.3113 | 137.3104 | 91.3579 | 132.6892 | 137.5743 |
| Sum Sq. Dev. | 7.1621 | 11.3553 | 193.3868 | 14.1080 | 12.6363 | 6.3876 | 12.5610 |
| Observations | 42 | 42 | 42 | 42 | 42 | 42 | 42 |

Source: Table 7.1.1 (in Appendix). Estimated with Eviews- 5.1.

Table 7.2.3.1 indicates that the variables under study are found to be normally distributed. The 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 except the variable FDI. The range of variation between maximum and minimum is also reasonable. The numeric of skewness of each variable is low and is mildly negatively skewed but for human capital and domestic credit availability is positively skewed. The figure for kurtosis in each variable is below 3 except two variables (lndi and lngrgdp) which confirms near normality. The Jarque-Bera test statistic also accepts the null hypothesis of normal distribution of each variable, except two variables (lndi and lngrgdp) but these have been normal in the first difference, with varying probabilities. The Sum and Sum Sq. Dev. ensures that there is no structural break of the data. Thus, the normality of the distribution is ensured in the study.

### 7.2.4 Correlation among the Variables of Domestic Investment Function

**Table7.2.4.1: Results of the Correlation Matrix of Domestic Investment Function**

| | lndi | lngrgdp | lnfdi | lnfi | lnrx | lnhc | lncr |
|---|---|---|---|---|---|---|---|
| lndi | 1.00 | 0.54 | 0.58 | 0.91 | 0.79 | 0.59 | 0.91 |
| lngrgdp | 0.54 | 1.00 | 0.52 | 0.58 | 0.50 | 0.39 | 0.57 |
| lnfdi | 0.58 | 0.52 | 1.00 | 0.62 | 0.64 | 0.62 | 0.67 |
| lnfi | 0.91 | 0.58 | 0.62 | 1.00 | 0.90 | 0.75 | 0.99 |
| lnrx | 0.79 | 0.50 | 0.64 | 0.90 | 1.00 | 0.72 | 0.90 |
| lnhc | 0.59 | 0.39 | 0.62 | 0.75 | 0.72 | 1.00 | 0.77 |
| lncr | 0.91 | 0.57 | 0.67 | 0.99 | 0.90 | 0.77 | 1.00 |

Source: Table 7.1.1 (in Appendix). The Test is performed with Eviews 5.1.

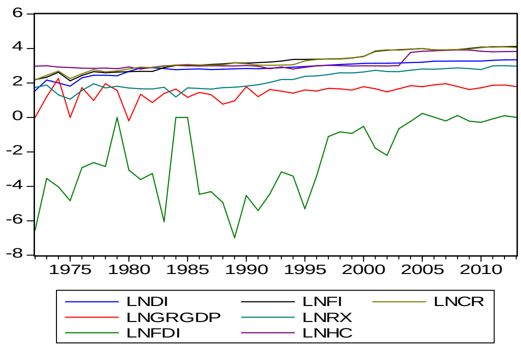
Table 7.2.4.1 explains the correlations among the variables of the domestic investment function. The correlation between domestic investment and GDP growth rate is 0.54 while the correlations between domestic investment and foreign direct investment, financial intermediary, real export, human capital and real exchange rate are 0.58, 0.91, 0.79, 0.59 and 0.91 percent respectively. The dependent variable *lndi* is positively related with all of the independent variables of the function as expected. It is consistent with the theory of domestic investment that it is the positive functions of GDP growth rate, financial intermediation, real export, human capital, domestic credit availability but negatively related with the foreign direct investment. The matrix shows that FDI is also positively related with the domestic investment function. It is due to insignificant contributions to the domestic economy of Bangladesh.

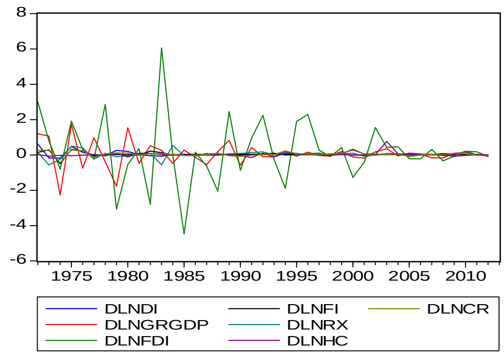
## 7.3 Results of Unit Root Tests of the Domestic Investment Function

Results show that the variables (*lngdp, lndi, lnfdi, lnfi, lnrx, lnhc, and lncr*) are non-stationary at levels. This means that they all have unit root problem and hence they suffer from instability problem in the short run. The graphical test, the correlogram test, the Augmented Dickey-Fuller test, the D-F (GLS) test and the Phillips-Perron test have been applied in this regard. The results of these tests are as follows:

### 7.3.1 Graphical Representation of the Stationarity of the Data of the Function

**Figure 7.3.1.1: Non-Stationary at Level Form Figure 7.3.1.2: Stationarity at First Difference**




From the Figure 7.3.1.1, it is clear that all variables are non-stationary at the level form because they all pass different ways with different slopes. They are not converged each other in the long run. Specially FDI curve is more fluctuated and diverged from other variables of the series. Thus, the data suffer with unit root problem at the level. The Figure 7.3.1.2 presents the stationarity of the data of the variables of the domestic investment function in the first difference. It indicates that all the variables are tended towards the same path converging each other in the long run. This nature of the differenced data may offer the robustness of the results. The data is differenced once and therefore, it provides the integration of order one that is, *I(1)*.

### 7.3.2 Result of the Correlogram Test

The non-stationarity of time series data can be tested by using autocorrelation function (ACF) based on the so-called Correlogram test. 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, $\pm 1.96(\frac{1}{n})$. Thus, if an estimated $\hat{\rho}_k$ falls inside the interval $(-1.96(\frac{1}{n}), +1.96(\frac{1}{n}))$, the hypothesis cannot be rejected that the true $\hat{\rho}_k$ is zero. But, if it lies outside this confidence interval, then the hypothesis can be rejected that the true $\hat{\rho}_k$ is zero.

The results of correlogram tests are shown as follows:

**Table 7.3.2.1: Correlogram of Domestic Investment (*lndi*) at the Level Form**

| Autocorrelation | Partial Correlation | Lag | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| . \|****** \| | . \|****** \| | 1 | 0.773 | 0.773 | 26.901 | 0.000 |
| . \|***** \| | . \|*. \| | 2 | 0.669 | 0.180 | 47.608 | 0.000 |
| . \|**** \| | . \| . \| | 3 | 0.573 | 0.025 | 63.161 | 0.000 |
| . \|*** \| | **\| . \| | 4 | 0.407 | -0.213 | 71.205 | 0.000 |
| . \|** \| | . \| . \| | 5 | 0.301 | -0.034 | 75.738 | 0.000 |
| . \|** \| | . \| . \| | 6 | 0.218 | 0.014 | 78.172 | 0.000 |
| . \|*. \| | . \| . \| | 7 | 0.149 | 0.035 | 79.348 | 0.000 |
| . \|*. \| | .*\| . \| | 8 | 0.069 | -0.090 | 79.604 | 0.000 |
| . \| . \| | . \| . \| | 9 | 0.027 | -0.004 | 79.645 | 0.000 |
| . \| . \| | . \|*. \| | 10 | 0.023 | 0.078 | 79.674 | 0.000 |
| . \| . \| | . \|*. \| | 11 | 0.028 | 0.084 | 79.721 | 0.000 |
| . \| . \| | . \| . \| | 12 | 0.037 | 0.003 | 79.804 | 0.000 |
| . \| . \| | .*\| . \| | 13 | 0.030 | -0.075 | 79.861 | 0.000 |
| . \| . \| | . \| . \| | 14 | 0.023 | -0.040 | 79.895 | 0.000 |

The Test is performed with Eviews 5.1

Table 7.3.2.1 shows the sample correlogram of domestic investment in Bangladesh. It shows the correlogram up to 14 lags[1]. The striking feature of this sample correlogram is that it starts at high value (about 0.773 at lag 1) and then tapers off gradually. At lag 5 the autocorrelation coefficient is 0.301. This type of pattern is generally an indication that the time series is non-stationary. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n*, where *n* is sample size. Since, the number of observation is *42*, implying a variance of *1/42* or about (0.0238) and the standard error is $\sqrt{0.0238}$= 0.1543. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1543)\,]$ = ± 0.303. The estimated coefficients up to lag 4 fall outside of the interval. This also implies that the null hypothesis cannot be rejected and the data series is non-stationary at the level form.

The correlogram test provides the same results for the rest of the variables of the domestic investment function like GDP growth rate, FDI, financial intermediation, real export, human capital and domestic credit availability in Bangladesh. Hence, data of the variables are non-stationary at the level form which indicates that the data are suffering with unit root problem. Since, the data of the variables of domestic investment function is non-stationary at level form it is better to test them in the first difference as:

[1] . Although there are tests about the maximum length of lag, in practice lags up to one-third of the sample size are generally used. But this happening is very much subjective.

**Table 7.3.2.2: Correlogram Test of Domestic Investment (*lndi*) in the First Difference**

| Autocorrelation | Partial Correlation | Lag | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| .*\| . \| | .*\| . \| | 1 | -0.110 | -0.110 | 0.5327 | 0.465 |
| ***\| . \| | ***\| . \| | 2 | -0.388 | -0.405 | 7.3388 | 0.025 |
| . \|** \| | . \|** \| | 3 | 0.278 | 0.211 | 10.933 | 0.012 |
| . \|** \| | . \|** \| | 4 | 0.267 | 0.208 | 14.319 | 0.006 |
| . \| . \| | . \|*** \| | 5 | 0.037 | 0.343 | 14.385 | 0.013 |
| **\| . \| | .*\| . \| | 6 | -0.195 | -0.070 | 16.308 | 0.012 |
| . \| . \| | . \| . \| | 7 | 0.048 | -0.006 | 16.429 | 0.021 |
| . \|*. \| | **\| . \| | 8 | 0.105 | -0.224 | 17.016 | 0.030 |
| . \| . \| | . \| . \| | 9 | 0.027 | 0.042 | 17.055 | 0.048 |
| .*\| . \| | . \| . \| | 10 | -0.063 | -0.052 | 17.281 | 0.068 |
| .*\| . \| | . \| . \| | 11 | -0.131 | -0.042 | 18.289 | 0.075 |
| . \| . \| | .*\| . \| | 12 | 0.004 | -0.156 | 18.290 | 0.107 |
| . \| . \| | .*\| . \| | 13 | 0.003 | -0.120 | 18.290 | 0.147 |
| .*\| . \| | .*\| . \| | 14 | -0.077 | -0.111 | 18.682 | 0.177 |

The Test is performed with Eviews 5.1

Table 7.3.2.2 shows the sample correlogram of domestic investment in the first difference. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n,* where n is sample size. Since, the number of observation is *41* after first difference, implying a variance of *1/41* or about (*0.0244*) and the standard error is $\sqrt{0.0244}$ = 0.1562. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1562)\,]$ = ± 0.306. All the estimated coefficients fall inside of the interval except the only one, the lag 2 (0.388). Therefore, the null hypothesis can be rejected at 5% significance level. This implies that the series is stationary after the first difference because the unit root problem has been vanished then. Same results are found for the rest of the variables of the domestic investment function. That is, they all are stationary at the first difference.

Therefore, the correlogram results show that the time series data is non-stationary at the level form because all autocorrelation coefficients remain outside the range of the sample variances that reject null hypothesizes. But, they all fall inside the range of sample variance *(1/n)* at the first difference, the data have been then stationary that is, they are integrated of order one *I(1).*

### 7.3.3 Result of the Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey-Fuller test is popularly used to test the existence of unit roots and determine the order of integration of the variables. The test is done both with and without a time trend. The results are shown in the Table 7.3.3.1.

**Table 7.3.3.1: The Augmented Dickey-Fuller (ADF) Unit Root Test Results**

| Variables | Lag | With an intercept but not a trend | | | | | With an intercept and a linear trend | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ADF Statistic | Critical Value (1%) | Critical Value (5%) | $R^2$ Value | *d* value | ADF Statistic | Critical Value (1%) | Critical Value (5%) | $R^2$ Value | *d* value |
| lndi | 1 | -3.5544 | -3.6010 | -2.9350 | 0.2447 | 1.8987 | -4.7443 | -4.1985 | -3.5236 | 0.4148 | 1.6899 |
| lngrgdp | 5 | -1.0667 | -3.6210 | -2.9434 | 0.6290 | 1.7944 | -4.0975 | -4.2349 | -3.5403 | 0.7547 | 1.9624 |
| lnfdi | 2 | -1.4742 | -3.6105 | -2.9389 | 0.2509 | 1.8603 | -3.8793 | -4.1985 | -3.5236 | 0.2849 | 1.9185 |
| lnfi | 1 | -0.9445 | -3.6056 | -2.9369 | 0.1179 | 2.1568 | -4.4418 | -4.1985 | -3.5236 | 0.3461 | 1.9557 |
| lnrx | 1 | -0.8492 | -3.6010 | -2.9350 | 0.0182 | 2.3326 | -3.7294 | -4.1985 | -3.5236 | 0.2723 | 2.0346 |
| lnhc | 1 | -0.4335 | -3.6010 | -2.9350 | 0.0048 | 1.9156 | -1.8472 | -4.1985 | -3.5236 | 0.1054 | 1.8868 |
| lncr | 1 | -1.4580 | -3.6010 | -2.9350 | 0.0517 | 2.2553 | -3.4561 | -4.1985 | -3.5236 | 0.2481 | 1.8694 |
| Δlndi | 1 | -7.7488 | -3.6105 | -2.9390 | 0.6365 | 1.4481 | -9.0594 | -4.2119 | -3.5298 | 0.7109 | 1.5834 |
| Δlngrgdp | 1 | -10.904 | -3.6105 | -2.9390 | 0.8855 | 1.6652 | -10.742 | -4.2119 | -3.5298 | 0.8864 | 1.6768 |
| Δlnfdi | 1 | -7.1732 | -3.6105 | -2.9390 | 0.6865 | 1.8760 | -7.0736 | -4.2119 | -3.5298 | 0.6866 | 1.8759 |
| Δlnfi | 1 | -7.7819 | -3.6105 | -2.9390 | 0.7426 | 1.1014 | -7.6469 | -4.2119 | -3.5298 | 0.7426 | 1.1011 |
| Δlnrx | 1 | -7.1390 | -3.6105 | -2.9390 | 0.6879 | 2.3785 | -6.9810 | -4.2119 | -3.5298 | 0.6885 | 2.3709 |
| Δlnhc | 1 | -6.0185 | -3.6056 | -2.9370 | 0.4880 | 1.9880 | -6.1025 | -4.2050 | -3.5266 | 0.5016 | 1.9843 |
| Δlncr | 1 | -8.4000 | -3.6105 | -2.9390 | 0.7115 | 1.2483 | -8.2663 | -4.2119 | -3.5298 | 0.7267 | 1.2485 |

The test is conducted with Eviews 5.1.
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 for gross capital formation; *lnfdi* = foreign direct investment; *lnfi* = financial intermediary proxy of $M_2$; *lnrx* = exports of goods and services as a ratio of GDP; *lnhc* = human capital proxied by secondary school enrolment ratio; *lncr* = domestic credit availability as a ratio of GDP. *Δ*= First Difference, Critical values (5%) are from Mackinnon (1991).

Table 7.3.3.1 indicates the level values are reported non-stationary because stationarity could not be achieved then as the calculated values are lesser than their critical values in absolute term. The null hypothesis could not be rejected then. Table further indicates that the non-stationarity problem has been 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 are rejected and the data are stationary after first difference. It can be said that the first difference of domestic investment and its different component series do not have a unit root problem and the data series are stationary. These suggest that the series are integrated of order one *I(1)*. The Table further shows the adjustment coefficient $R^2$ (the goodness of fit) indicates a high rate of fit for the data series after the first difference whereas, they are insignificant in the level form. The Durbin Watson *d* statistics indicate that the level of autocorrelation in the data series. It shows that each of the data series contains a high level of autocorrelation in the level form but the autocorrelation problems have been reduced from the data series at the first difference.

### 7.3.4 Result of the D-F (GLS) Test

Table 7.3.4.1 states that the data of domestic investment function have however been non-stationary at their level form. Because the D-F (GLS) statistics are less than their critical values at both 1 and 5 percent level of significance. Therefore, the null hypothesizes of unit root problems have been accepted. But the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data have been stationary for the integration of order one *I(1)*.

**Table 7.3.4.1: The Results of D-F (GLS) Test of Domestic Investment Function**

| Variables | Lag | With An Intercept But Not A Trend | | | With An Intercept and A Linear Trend | | |
|---|---|---|---|---|---|---|---|
| | | D-F GLS Statistic | Critical Value (1%) | Critical Value (5%) | D-F GLS Statistic | Crit. Value (1%) | Crit. Value (5%) |
| lndi | 1 | -0.5067 | -2.6225 | -1.9491 | -2.4657 | -3.7700 | -3.1900 |
| lngrgdp | 1 | -1.5246 | -2.6241 | -1.9493 | -7.0924 | -3.7700 | -3.1900 |
| lnfdi | 1 | -2.1723 | -2.6226 | -1.9491 | -3.7664 | -3.7700 | -3.1900 |
| lnfi | 1 | 0.2228 | -2.6226 | -1.9491 | -4.3696 | -3.7700 | -3.1900 |
| lnrx | 1 | -0.6617 | -2.6226 | -1.9491 | -3.2140 | -3.7700 | -3.1900 |
| lnhc | 1 | -0.3979 | -2.6226 | -1.9491 | -1.6730 | -3.7700 | -3.1900 |
| lncr | 1 | 0.0680 | -2.6226 | -1.9491 | -3.2167 | -3.7700 | -3.1900 |
| Δlndi | 1 | -2.5121 | -2.6241 | -1.9493 | -4.685 | -3.7700 | -3.1900 |
| Δlngrgdp | 1 | -3.2668 | -2.6256 | -1.9496 | -9.8987 | -3.7700 | -3.1900 |
| Δlnfdi | 1 | -5.7236 | -2.6241 | -1.9493 | -7.3180 | -3.7700 | -3.1900 |
| Δlnfi | 1 | -7.7781 | -2.6241 | -1.9493 | -6.8940 | -3.7700 | -3.1900 |
| Δlnrx | 1 | -6.8220 | -2.6256 | -1.9496 | -7.1419 | -3.7700 | -3.1900 |
| Δlnhc | 1 | -6.0970 | -2.6241 | -1.9493 | -6.2254 | -3.7700 | -3.1900 |
| Δlncr | 1 | -5.2120 | -2.6241 | -1.9493 | -6.6551 | -3.7700 | -3.1900 |

The test is conducted using Eviews 5.1.
Note: 95% critical value for the Augmented Dickey – Fuller statistic=-2.9665
* Critical values (5%) are from Mackinnon (1991).

### 7.3.5 Result of the Phillips-Perron Test

**Table 7.3.5.1: Results of Phillips-Perron (PP) Test of Domestic Investment Function**

| Variables | With An Intercept but Not a Trend | | | With An Intercept and a Linear Trend | | |
|---|---|---|---|---|---|---|
| | PP Statistic | Crit. Value (1%) | Crit. Value (5%) | PP Statistic | Crit. Value (1%) | Crit. Value (5%) |
| lndi | -3.9678 | -3.6010 | -2.9350 | -4.9422 | -4.1985 | -3.5236 |
| lngrgdp | -6.8190 | -3.6010 | -2.9350 | -11.4151 | -4.1985 | -3.5236 |
| lnfdi | -3.0970 | -3.6010 | -2.9350 | -3.9603 | -4.1985 | -3.5236 |
| lnfi | -1.2216 | -3.6010 | -2.9350 | -4.446 | -4.1985 | -3.5236 |
| lnrx | -0.4197 | -3.6010 | -2.9350 | -3.6227 | -4.1985 | -3.5236 |
| lnhc | -0.4698 | -3.6010 | -2.9350 | -1.8797 | -4.1985 | -3.5236 |
| lncr | -1.4580 | -3.6010 | -2.9350 | -3.5281 | -4.1985 | -3.5236 |
| Δlndi | -10.7942 | -3.6056 | -2.9369 | -17.5229 | -4.2050 | -3.5266 |
| Δlngrgdp | -49.3116 | -3.6056 | -2.9369 | -53.2653 | -4.2050 | -3.5266 |
| Δlnfdi | -9.1768 | -3.6056 | -2.9369 | -9.0325 | -4.2050 | -3.5266 |
| Δlnfi | -10.4265 | -3.6056 | -2.9369 | -11.0649 | -4.2050 | -3.5266 |
| Δlnrx | -8.6033 | -3.6056 | -2.9369 | -8.8178 | -4.2050 | -3.5266 |
| Δlnhc | -6.0185 | -3.6056 | -2.9369 | -6.1029 | -4.2050 | -3.5266 |
| Δlncr | -7.8333 | -3.6056 | -2.9369 | -8.1324 | -4.2050 | -3.5266 |

The test is conducted using Eviews 5.1.
Note: 95% critical value for the Augmented Dickey-Fuller statistic=-2.9665.
* Critical values (5%) are from Mackinnon (1991). *MacKinnon (1996) one-sided p-values.

Table 7.3.5.1 explains that the level values are reported non-stationary because stationarity could not be achieved then as the calculated values of PP test are lower than their critical values in absolute term. The null hypothesis could not be rejected then. Table further indicates that the non-stationarity problem has been vanished after the first difference of the data; because the PP statistics are greater than their critical values at 1% and 5% level of significance and the null hypothesis of non-stationarity are rejected and the data have been stationary after the first difference. It can be said that the first difference of domestic investment and its various component series do not have a unit root problem and the data series are stationary. These suggest that the series are integrated of order one *I(1)*.

The time series data of domestic investment function have however been non-stationary at the level form because all of the tests statistics (the correlogram, ADF, D-F (GLS), and P-P tests) are less than their critical values. Therefore, the null hypothesizes of unit root problems have been accepted and the data series suffers with a unit root problem at their level form. But the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data becomes stationary for the integration of order one *I(1)*.

### 7.4 Result of the Cointegration Test of the Domestic Investment Function

The Johansen's Maximum Likelihood (ML) cointegration technique is applied to explore the possibility of long run equilibrium. This method usually uses two test statistics: the trace ($T_r$) test and the maximum eigen value ($\lambda_{\max}$) test. Since the variables *lndi, lngrgdp, lnfdi, lnfi, lnrx, lnhc, lncr* (domestic investment, foreign direct investment, financial intermediation, country's real exports, human capital and availability of domestic credit respectively) are integrated of order 1 (one), it confirms the possibility of cointegration between them. The estimated results of cointegration tests, particularly the trace and the max-eigen value statistics are presented in the Table-7.4.1 to 7.4.6.

**Table 7.4.1: Cointegration between Domestic Investment and GDP Growth Rate**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.7244 | 77.3822 | 15.4947 | 0.0000 | 50.2675 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5011 | 27.1146 | 3.8415 | 0.0000 | 27.1147 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1.
Note: * Denotes the rejection of the hypothesis at 0.05 levels.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Table 7.4.1 shows that the trace and max-eigen value statistics for domestic investment ($\Delta$*lndi*) and GDP growth rate ($\Delta$*lngrgdp*) are 77.38 and 50.27 for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.00 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis is accepted at 5 percent significance level. In the second row of the table, the values of trace and max-eigen value both are greater than their critical values at 5 % (with 0.0000 probability) significance level. Hence, the null hypothesis of no cointegration is also rejected and the alternative hypothesis of cointegration relation is accepted. Therefore, it is clear that there are 2 (two) cointegrating stable relations between domestic investment and GDP growth rate. Results also show that the null hypothesis of at most two cointegrating vectors ($H_0$: r <= 0 and $H_0$: r <= 1) is rejected at 5% level of significance, according to both the trace and max-eigen value statistics.

**Table 7.4.2: Cointegration between Domestic Investment and FDI**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6333 | 73.7449 | 15.4947 | 0.0000 | 39.1283 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5884 | 34.6167 | 3.8415 | 0.0000 | 34.6167 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1.
Note: * Denotes the rejection of the hypothesis at 0.05 levels.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Table 7.4.2 states that the trace and max-eigen value statistics for domestic investment ($\Delta lndi$) and FDI ($\Delta lnfdi$) are 73.74 and 39.13 for the null hypothesis r=0; both the values are greater than the critical values of 15.49 and 14.26 at 5% (with 0.0000 probability) level of significance in the first row. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis is accepted at 5 percent significance level. In the second row of the table, the values of trace and max-eigen value both are also greater than the critical values at 5 % (with 0.0000 probability) significance level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Therefore, it is clear that there are 2 (two) cointegrating stable relations between domestic investment and foreign direct investment in Bangladesh.

**Table7.4.3: Cointegration between Domestic Investment and Financial Intermediation**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6251 | 55.1846 | 15.4947 | 0.0000 | 38.2582 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.3521 | 16.9265 | 3.8415 | 0.0000 | 16.9265 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1.
Note: * Denotes the rejection of the hypothesis at 0.05 levels.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Table 7.4.3 explains that the trace and max-eigen value statistics for domestic investment ($\Delta lndi$) and domestic financial intermediation ($\Delta lnfi$) are 55.18 and 38.26 for the null hypothesis r=0; both the values are greater than their critical values of 15.49 and 14.26 at 5%  ( with 0.00 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis is accepted at 5 percent significance level. In the second row of the table, both the trace and max-eigen value statistics are greater than the critical values at 5 % (with 0.0000 probability) significance level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Therefore, it is clear that there are 2 (two) cointegrating stable relations between domestic investment and domestic financial intermediation.

**Table 7.4.4: Cointegration between Domestic Investment and Real Export**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.7676 | 77.8149 | 15.4947 | 0.0000 | 56.9178 | 14.2646 | 0.0004 | None* |
| r<=1 | r=2 | 0.4148 | 20.8971 | 3.8415 | 0.0000 | 20.8971 | 3.8415 | 0.0000 | At most 1* |

The tests are performed with the software Eviews- 5.1.
Note: * Denotes the rejection of the hypothesis at 0.05 levels.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Table 7.4.4 shows that the trace and max-eigen value statistics for domestic investment ($\Delta lndi$) and real exports ($\Delta lnrx$) are 77.81 and 56.92for the null hypothesis r=0;  both the values are greater than the critical values of 15.49  and 14.26 at 5%  ( with 0.0000 and 0.0004 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis is accepted at 5 percent significance level. In the second row of the table, the values of trace and max-eigen values are 20.90 and 20.90 for the null hypothesis $H_0$<=1, both values are also greater than the critical values 3.84 at 5 % (with 0.0000 probabilities) significance level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Thus, there are 2 (two) cointegrating stable relationships between domestic investment and real export in Bangladesh.

**Table 7.4.5: Cointegration between Domestic Investment and Human Capital**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6314 | 53.8609 | 15.4947 | 0.0000 | 38.9159 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.3184 | 14.9451 | 3.8415 | 0.0001 | 14.9451 | 3.8415 | 0.0001 | Atmost 1* |

The tests are performed with the software Eviews- 5.1.
Note: * Denotes the rejection of the hypothesis at 0.05 levels.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.  14.94511

Table 7.4.5 states that the trace and max-eigen value statistics for domestic investment ($\Delta lndi$) and human captal ($\Delta lnhc$) are 53.86 and 38.92for the null hypothesis r=0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected at 5 percent significance level. In the second row of the table, the trace and max-eigen value statistics are greater than the critical values 3.84 at 5 % (with 0.0001 probability) significance level. Hence, the null hypothesis of no cointegration is also rejected. Therefore, it is clear that there are 2 (two) cointegrating stable relations between domestic investment and human capital in Bangladesh.

**Table 7.4.6: Cointegration between Domestic Investment and Domestic Credit**

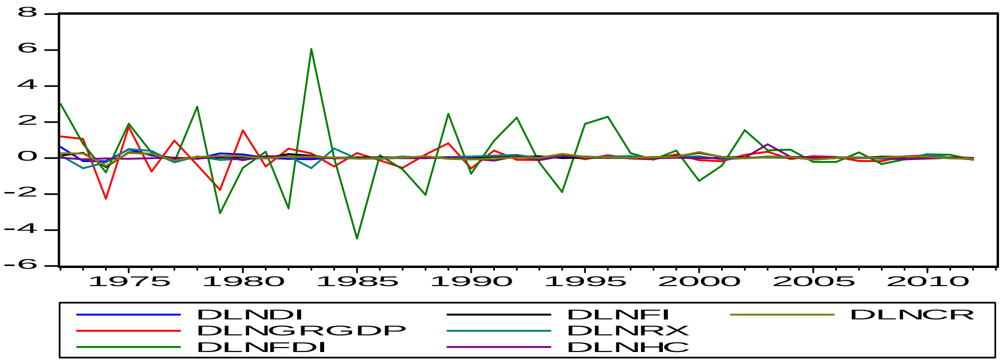
| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.5987 | 51.3074 | 15.4947 | 0.0000 | 35.6033 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.3315 | 15.7041 | 3.8415 | 0.0001 | 15.7041 | 3.8415 | 0.0001 | At most 1* |

The tests are performed with the software Eviews- 5.1.
Note: * Denotes the rejection of the hypothesis at 0.05 levels.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.

Table 7.4.6 presents that the trace and max-eigen value statistics for domestic investment ($\Delta lndi$) and domestic credit availability ($\Delta lncr$) are 51.31 and 35.60 or the null hypothesis r=0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis is accepted at 5 percent significance level. In the second row of the table, the values of trace and max-eigen value both are greater than the critical values at 5 % (with 0.0001 probability) significance level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Thus, there are 2 (two) cointegrating stable relationships between domestic investment and domestic credit availability in Bangladesh. The results are also supported by the following Figure 7.4.1:

Figure 7.4.1 shows that there are long run cointegrated relationships between domestic investment *($\Delta lndi$)* and its different components such as GDP growth rate ($\Delta lngrgdp$), FDI ($\Delta lnfdi$), financial intermediation ($\Delta lnfi$), real export ($\Delta lnrx$), human capital ($\Delta lnhc$), and domestic credit availability *($\Delta lncr$).* In Bangladesh, there are slow rates of fluctuations in the lines shown in the figure indicate that they all are moving towards the right. The domestic investment, financial intermediation, real export, human capital and domestic credit lines are steadier while the GDP growth and FDI lines are very much fluctuated but in the long run they all are becoming steadier to the right. Thus, the curves indicated by the figure are converging each other over the periods.

**Figure 7.4.1: Cointegration between Domestic Investment and Its Components**




Note: The figure is drawn with the differenced data and performed with the software Eviews 5.1.

The cointegration test results therefore, indicate that there are 2 (two) cointegrating long run relationships between the pair-wise variables of the domestic investment function. Since the data are stationary at the first difference, the cointegrated relationships of the differenced variables have been justified and they all have been contegrated in the long run. Because, the trace and max-eigen value tests statistics are significant for every case. Therefore, there are two cointegrating equations among the variables and they are converging each other in the long-run.

### 7.5 Estimation of the Domestic Investment Function

Since all variables are cointegrated each other, the function follows the properties of ordinary least squares (OLS) method. It is therefore, very much convenient to estimate the domestic investment function (6.2.1.2) with the OLS method. In this case, the software Eviews-5.1 has been conducted. The OLS estimated regression equation is:

$$\Delta \ln di = 0.018854 + 0.038227\Delta \ln grgdp + 0.007096\Delta \ln fdi - 0.000601\Delta \ln fi + 0.260025{**}\Delta \ln rx - 0.020120\Delta \ln hc + 0.318036{*}\Delta \ln cr \ldots\ldots\ldots\ldots\ldots\ldots(7.5.1)$$

(0.019354) (0.029153) (0.010561) (0.004752) (0.092429)(0.136432) (0.162744)

[0.974191] [1.311263] [0.671908] [-0.126408] [2.813244] [-0.147475] [1.954211]

The estimation is conducted with Eviews 5.1.
Note: The estimation is done with the OLS method.
* Coefficient is significant at 0.05 levels of significance. ** Coefficient is significant at 0.01 levels.
Brackets show the standard error of the function; whereas, the *t*-statistics are shown by the parenthesis.

The estimated coefficients of the domestic investment equation (7.5.1) indicate that they all are related with dependent variable (domestic investment) that may be positive or negative. The regression result shows that the coefficient of GDP growth rate is positive as expected. The coefficient of GDP growth rate (0.038) is low elastic to the domestic investment. The coefficient of FDI, real exports, and domestic credit are positively related to domestic investment as expected but the coefficient of real exports is significant at 0.01 levels. The coefficients of financial intermediation and human capital are negative as expected to domestic investment but they are not significant. Domestic investment of Bangladesh is however influenced by all of the factors but financial intermediation and human capital have the significantly negative impact on domestic investment; this is partially contradicted with (Hermes & Lensink, 2003). In contrast, GDP growth rate, FDI, real export and domestic credit have the positive impact on the domestic investment of Bangladesh of which real export and domestic credit have significant impact. Thus, the null hypothesis of FDI negatively affect domestic investment in Bangladesh is rejected that contradicts with the theory; it is due to very negligible contribution to the domestic economy of Bangladesh.

### 7.5.1 Result of the Wald Test

**Table 7.5.1.1: Results of the Wald Test of Coefficients of Restrictions**

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| F-statistic | 2.149702 | (2, 34) | 0.1321 |
| Chi-square | 4.299404 | 2 | 0.1165 |
| Null Hypothesis Summary: | | | |
| Normalized Restriction (= 0) | | Value | Std. Err. |
| C(1) | | 0.024875 | 0.018720 |
| C(3) - 2*C(4) | | 1.055055 | 0.582928 |

Note: Restrictions are linear in coefficients. The Tests are performed with Eveiws 5.1.

Table 7.5.1.1 indicates the Wald test of domestic investment function which confirms that the coefficients are jointly insignificant because the probabilities are greater than the significance level ($\alpha$=0.05, 0.01) for both F-statistic and Chi-square test that ensures the acceptance of the null hypothesis of insignificant coefficients. But, individually, some variables are significant for domestic investment in Bangladesh.

## 7.6 Result of Vector Error Correction Modeling (VECM)

Error correction model between domestic investment and its various components is used to show the short run dynamics to the long run equilibrium of the function. A significant lagged ECT coefficient implies that past equilibrium errors affect current outcomes. It is needed to decide on what lags to choose (up to the maximum lag of 2 used in the procedures). The long term effects of the variables in question can be represented by the estimated cointegration vector. The estimated coefficient of error correction term shows the long run effect and the estimated coefficient of lagged variables (eg. Export and domestic investment) shows the short term effect. If $\alpha_1$ is negative and statistically significant, the causation goes from real exports to domestic investment. If $\alpha_2$ on the other hand, is negative and significant the causation goes from domestic investment to real export in the long run. If both $\alpha_1$ and $\alpha_2$ are negative and significant then both Granger cause each other in the long run. Tables 7.6.1.1 to Table 7.6.1.6 indicate that whether there is long and short run relationship among domestic investment and its various components with VECM.

**Table 7.6.1.1: Result of VECM for Domestic Investment and GRGDP (*Δlndi, Δlngrgdp*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | |
| $\Delta lngrgdp_{1t}$ | 2.667657** (0.50677) [5.26408] | 0.163138 (0.41009) [ 0.39781] | -0.747266* (0.20009) [-3.73457] |
| Constant | -0.020502 | 0.076036 (0.07088) [ 1.07278] | |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic.
** denotes the rejection of the hypothesis at 1 percent significance level.
* denotes rejection of the hypothesis at 5 percent significance level.

In Table 7.6.1.1, the coefficient of variable GDP growth rate is 2.67 which is significant at both 5 and 1 percent level. Such magnitude implies that an increase in growth rate will increase significantly domestic investment in the long run. The short run coefficient of GDP grwoth rate is positive but statistically insignificant. This implies that an increase in GDP growth rate; domestic investment will not be changed significantly in the short run. The error correction coefficient (-0.75) and the t-statistic is [-3.73457]. Since, the coefficient is negative and t-statistic is statistically significant, it can be said that causation goes from GDP growth rate to domestic investment. That is, there is 75% short run dynamic adjustment to the long run equilibrium between GDP growth rate and domestic investment in Bangladesh.

Table 7.6.1.2 shows that the coefficient of variable foreign direct investment is -0.129 which is significant at 5 percent level as the *t*-statistic is greater than 2. Such magnitude implies that 1 percent increase in foreign direct investment will decrease domestic investment by 0.129 percent in the long run. The short run coefficient of FDI is positive but statistically insignificant. This implies that an increase in FDI inflows, domestic investment will not increase significantly in the short run. Since, the coefficient of ECT is positive but *t-* statistic there is short run dynamic adjustment to the long run divergence by 9.22 percent between FDI and domestic investment in Bangladesh.

**Table 7.6.1.2: Result of VECM for Domestic Investment and FDI (*Δlndi, Δlnfdi*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | |
| $\Delta lnfdi_{1t}$ | -0.129097*<br>(0.03479)<br>[-3.71094] | 0.003441<br>(0.25909)<br>[ 0.01328] | |
| Constant | -0.018036 | -0.038641<br>(0.27597)<br>[-0.14002] | 9.222041**<br>(2.67201)<br>[ 3.45135] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic.
** denotes the rejection of the hypothesis at 1 percent significance level.
* denotes rejection of the hypothesis at 5 percent significance level.

**Table 7.6.1.3: Result of VECM for DI and Financial Intermediation(*Δlndi, Δlnfi*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | |
| $\Delta lnfi_{1t}$ | -5.013802**<br>(0.89295)<br>[-5.61489] | 0.396192*<br>(0.18404)<br>[ 2.15275] | |
| Constant | 0.161515 | 0.010726<br>(0.01071)<br>[ 1.00157] | 0.261967**<br>(0.04558)<br>[ 5.74705] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic.
** denotes the rejection of the hypothesis at 1 percent significance level.
* denotes rejection of the hypothesis at 5 percent significance level.

Table 7.6.1.3 explains that the coefficient of variable financial intermediation is -5.02 which is significant at both 5 percent and 1 percent level that is, there is long run effect of financial intermediation on domestic investment. The short run coefficient of financial intermediation is also positive and statistically significant at 5 percent level. This implies that a 1 percent increase in financial intermediation; domestic investment will be increased by 4 percent in the short run. The error correction coefficient on the other hand, is positive and statistically significant, it can be said that there is short run dynamic adjustment with a divergence by 26 percent between financial intermediation and domestic investment in Bangladesh.

Table 7.6.1.4 shows that the coefficient of variable real export is 5.94, which is significant at both 5 percent and 1 percent level. It implies that one percent increase in real export will increase domestic investment by 5.94 percent in the long run. The short run coefficient of real export is also positive but statistically insignificant. This implies that an increase in export, domestic investment will not be increased significantly in the short run.

The error correction coefficient (-0.29) is negative and t statistics is statistically significant, it can be said that causation goes from real export to domestic investment. That is, there is short run dynamic adjustment to the long run equilibrium by 29 percent between real export and domestic investment in Bangladesh.

**Table 7.6.1.4: Result of VECM for Domestic Investment and Real Export (*Δlndi, Δlnrx*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | -0.291227** (0.05986) [-4.86552] |
| $\Delta lnrx_{1t}$ | 5.936082** (1.19385) [ 4.97221] | 0.208666 (0.25629) [ 0.81418] | |
| Constant | -0.300159 | 0.000903 (0.02489) [ 0.03626] | |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic.
** denotes the rejection of the hypothesis at 1 percent significance level.
* denotes rejection of the hypothesis at 5 percent significance level.

**Table 7.6.1.5: Result of VECM for DI and Human Capital (*Δlndi, Δlnhc*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | -0.522769* (0.16084) [-3.25029] |
| $\Delta lnhc_{1t}$ | 1.835431* (0.54121) [ 3.39132] | -0.006198 (0.24615) [-0.02518] | |
| Constant | -0.078725 | 0.002956 (0.02382) [ 0.12412] | |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic.
** denotes the rejection of the hypothesis at 1 percent significance level.
* denotes rejection of the hypothesis at 5 percent significance level.

Table 7.6.1.5 explains that the coefficient of variable human capital is 1.84 which is significant at 5 percent level. This implies that one percent increase in human capital will increase domestic investment by 1.84 percent in the long run. The short run coefficient of human capital is negative but statistically insignificant. Again, the error correction coefficient (-0.52) is negative and t statistics is significant, it can be said that causation goes from human capital to domestic investment. That is, there is short run dynamic adjustment to the long run equilibrium by 52 percent between human capital and domestic investment in Bangladesh.

Table 7.6.1.6 states that the coefficient of variable domestic credit (-2.21), which is negative but significant at both 5 percent and 1 percent level. This implies that one percent increase in domestic credit will decrease domestic investment by 2.21 percent in the long run. The short run coefficient of total export is also positive but statistically insignificant.

The error correction coefficient (0.50) is positive and significant, it can be said that causation does not go from domestic credit to domestic investment. That is, there is short run dynamic adjustment with the long run divergence by 50 percent between domestic credit and domestic investment in Bangladesh.

**Table 7.6.1.6: Result of VECM Domestic Investment and Domestic Credit (*Δlndi, Δlncr*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | 0.496536** (0.11819) [ 4.20104] |
| $\Delta lncr_t$ | -2.208332** (0.52412) [-4.21343] | 0.258807 (0.20349) [ 1.27183] | |
| Constant | 0.046129 | 0.005939 (0.01239) [ 0.47944] | |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic.
** denotes the rejection of the hypothesis at 1 percent significance level.
* denotes rejection of the hypothesis at 5 percent significance level.

Long run causalities are however, existed between GDP growth rate, financial intermediation, real exports, human capital and domestic credit to the domestic investment in Bangladesh while FDI, financial intermediation and domestic credit availability are negatively and others are positively related in the long run. The short run effects exist between the domestic investment and financial intermediation. The ECM term of all independent variables is significant that indicates the long term causations go to the domestic investment in Bangladesh from these factors and there are significant scopes for short run dynamic adjustment to the long run equilibrium among them.

## 7.7 Results of Vector Autoregression (VAR) Model

According to the theory of elasticity, it is known to all that the coefficients of the cointegrating equation with log value is known as the long term elasticity of the function. The first order lagged differenced value on the other hand, is known as the short run elasticity of the function. That is, the short run elasticities are represented by the coefficients of the respective first difference of the independent variable. The long and short run elasticities of the domestic investment function are found with applying the VAR method:

The first row of the Table 7.7.1 indicates the long run elasticities of the domestic investment function because it contains the coefficients of the log values of the estimated function. Table further shows that the long run elasticities of the coefficients of real exports, domestic credit availability are significant at 0.05 levels of significance. That means an increase in real export and domestic credit may increase the domestic investment growth by 26 percent and 32 percent respectively. The elasticities of financial intermediation and human capital are negative but statistically insignificant. Others are positive but not statistically significant. The coefficient of FDI is also positive; it is due to very negligible contribution to the domestic investment.

**Table 7.7.1: Long run and Short-run Elasticities of the Domestic Investment Function**

| Elasticity | Constant | Δlngrgdp | Δlnfdi | Δlnfi | Δlnrx | Δlnhc | Δlncr |
|---|---|---|---|---|---|---|---|
| Long-run | 0.018854<br>0.019354<br>[0.974191] | 0.038227<br>0.029153<br>[1.311263] | 0.007096<br>0.010561<br>[0.671908] | -0.000601<br>0.004752<br>[-0.126408] | 0.260025*<br>[0.092429]<br>2.813244 | -0.020120<br>0.136432<br>[-0.147475] | 0.318036*<br>0.162744<br>[1.954211] |
| Short-run | 0.001587<br>(0.00754)<br>[ 0.21064] | 1.404694**<br>(0.18436)<br>[ 7.61929] | -0.209856**<br>(0.02349)<br>[-8.93396] | 0.020526*<br>(0.00722)<br>[ 2.84112] | -0.001359<br>(0.26915)<br>[-0.00505] | -0.274968<br>(0.20410)<br>[-1.34720] | 0.376160<br>(0.33762)<br>[ 1.11414] |

Source: Estimated with VAR method of the domestic investment function.
The test is performed with Eviews 5.1.
** Statistically significant at 1 percent level of significance. * Significant at 5 percent level of significance.The standard error is shown in the bracket and the t-statistics are shown by the parenthesis.

The coefficients of the differenced independent lag values are the short term elasticities of the domestic investment function shown in the second row of the above table. It shows that the coefficients of the GDP growth rate, FDI and financial intermediations are statistically significant in the short run at 1 and 5 percent level of significance. The coefficients of real exports and human capital are negatively related whereas, the coefficient of constant term, GDP growth rate, financial intermediation and domestic credit are positively elastic to domestic investment in Bangladesh in the short run.

### 7.8 Result of Granger Causality Test

Granger Causality theorem (1988) mentions that there should be at least one direction of causality remained between two variables, if they are cointegrated in the same order. Accordingly, the causality model has been estimated and that has been tested by F-statistics. Since, F-statistic is statistically significant, the null hypothesis of no causation can be rejected, otherwise accepted. Ganger causality is estimated using different lags and the results are presented by the following table:

Table 7.8.1 shows the pair-wise Granger causality in the short run. Result shows that the null hypothesis of GDP growth rate does not cause domestic investment is rejected at 0.01 percent and the alternative hypothesis is accepted indicated by the first row. From this result, it can be said that GDP growth rate leads domestic investment in Bangladesh to grow. Since, F statistic is insignificant indicated by the 2$^{nd}$ line of the first row, the null hypothesis that domestic investment does not cause GDP growth rate is accepted that is, domestic investment in Bangladesh does not lead GDP growth rate to grow in the short run. The 2nd row of the table indicates that the F-statistic is insignificant as p-value is greater than significance level (α%) resulting the null hypothesis of FDI does not cause domestic investment is accepted while domestic investment causes FDI in Bangladesh to grow as F-statistics is significant at 0.05 significance level. In case of export and domestic investment, both the null hypotheses are rejected as F- statistics are significant at both 0.01 and 0.05 significance levels. That is, both export and domestic investment in Bangladesh cause each other to grow at the same tandem. Human capital does not cause domestic investment but domestic investment Granger causes human capital as F- statistics is insignificant for the previous one but significant for the later. The null hypotheses of no causations for domestic credit and domestic investment are rejected as the F-statistics are significant for both cases at 0.05 for the first and 0.01 levels for the second. This implies that both domestic credit and domestic investment in Bangladesh cause each other to grow in the short run.

**Table 7.8.1: Pair-wise Granger Causality Result of Domestic Investment Function**

| Null Hypothesis | Obs. | Lag | F-Statistic | Probability | Decisions |
|---|---|---|---|---|---|
| *Δlngrgdp* does not Granger Cause *Δlndi* | 39 | 2 | 8.87487 | 0.00079 | Rejected** |
| *Δlndi* does not Granger Cause *Δlngrgdp* | | | 0.70899 | 0.49927 | Accepted |
| *Δlnfdi* does not Granger Cause *Δlndi* | 34 | 7 | 1.72805 | 0.16204 | Accepted |
| *Δlndi* does not Granger Cause *Δlnfdi* | | | 2.54819 | 0.04968 | Rejected* |
| *Δlnfi* does not Granger Cause *Δlndi* | 39 | 1 | 3.21610 | 0.08088 | Rejected* |
| *Δlndi* does not Granger Cause *Δlnfi* | | | 1.76622 | 0.19178 | Accepted |
| *Δlnrx* does not Granger Cause *Δlndi* | 39 | 2 | 4.19845 | 0.02347 | Rejected* |
| *Δlndi* does not Granger Cause *Δlnrx* | | | 7.76382 | 0.00167 | Rejected** |
| *Δlnhc* does not Granger Cause *Δlndi* | 28 | 13 | 19.2057 | 0.17695 | Accepted |
| *Δlndi* does not Granger Cause *Δlnhc* | | | 129.725 | 0.06863 | Rejected* |
| *Δlnhcr* does not Granger Cause *Δlndi* | 39 | 2 | 2.48392 | 0.09843 | Rejected* |
| *Δlndi* does not Granger Cause *Δlnhcr* | | | 8.02345 | 0.00140 | Rejected** |

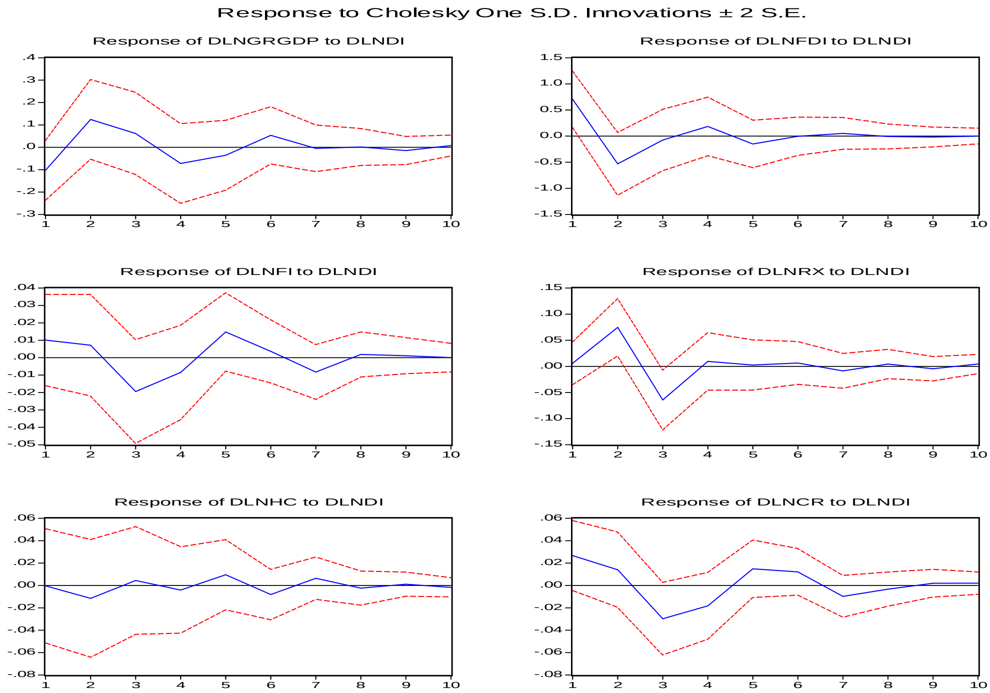
The test is performed with the software Eviews 5.1.
Note: * Denotes the rejection of the null hypothesis at 0.05 levels.
** Denotes the rejection of the null hypothesis at 0.01 levels.

Hence, there are bidirectional causalities between real export and domestic credit availability to domestic investment in Bangladesh because they cause each other to grow at the same tandem in the short run. On the other hand, there is unidirectional causality existed between GDP growth rate, FDI, financial intermediation and human capital to domestic investment in Bangladesh in the short run.

### 7.9 Impulse Response Analysis of the Function in the VAR Model

The impulse responses imply that the independent variables are well responded in response with the domestic investment and a long run convergence is established. The response of domestic investment to other variables is correlated and strongly convergent.

**Figure 7.9.1: Impulse Responses Analysis of the Domestic Investment Function**




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

Figure 7.9.1 presents the impulse response of the domestic investment to the GDP growth rate (Δlngrgdp), the foreign direct investment (Δlnfdi), the financial intermediation (Δlnfi), the real exports (Δlnrx), the human capital (Δlnhc), and the domestic credit (Δlncr) in the Bangladesh context for the post-independent era. Figure (7.9.1.b) presents the response of FDI to domestic investment which reveals that it was only favourable in the first and fourth period but negative in all other periods. Thus, this has a bad implication on the performances of Bangladesh economy. Likewise, GDP growth rate has negative effect on domestic investment in the first and fourth period but increases henceforth. Indeed, financial intermediation and real exports have bad effects in the third period but have overall steady positive effect on domestic investment. Human capital has slow negative but steady effect whereas, domestic credit has negative effect on domestic investment but it is converging with domestic investment over the period.

Therefore, 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 domestic investment in Bangladesh. Diversification of responses of financial intermediation as well as domestic credit availability is very high in the short run yet they have responded towards the same path in the long run. Overall, the impulse response function traces positive influence of the response variables to the domestic investment in Bangladesh.

## 7.10 Result of Variance Decompositions of the Variables

### Table 7.10.1: Results of Variance Decompositions of the DI Function with VAR Model

| Period | S.E. | Δlndi | Δlngrgdp | Δlnfdi | Δlnfi | Δlnrx | Δlnhc | Δlncr |
|---|---|---|---|---|---|---|---|---|
| 1 | 0.06 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.08 | 68.71 | 20.31 | 4.72 | 4.53 | 0.37 | 0.50 | 0.85 |
| 3 | 0.09 | 63.08 | 18.23 | 7.90 | 3.91 | 4.73 | 0.46 | 1.69 |
| 4 | 0.09 | 60.09 | 16.61 | 7.85 | 3.97 | 4.96 | 4.06 | 2.47 |
| 5 | 0.10 | 59.49 | 17.15 | 7.47 | 3.80 | 5.33 | 3.88 | 2.87 |
| 6 | 0.10 | 58.88 | 17.16 | 7.67 | 3.88 | 5.30 | 4.20 | 2.92 |
| 7 | 0.10 | 58.42 | 17.76 | 7.60 | 3.89 | 5.28 | 4.17 | 2.89 |
| 8 | 0.10 | 57.83 | 18.48 | 7.53 | 3.85 | 5.24 | 4.21 | 2.86 |
| 9 | 0.10 | 57.70 | 18.44 | 7.52 | 3.99 | 5.25 | 4.20 | 2.88 |
| 10 | 0.10 | 57.58 | 18.45 | 7.52 | 4.05 | 5.23 | 4.22 | 2.94 |
| Cholesky Ordering: Δlndi Δlngrgdp Δlnfdi Δlnfi Δlnrx Δlnhc Δlncr | | | | | | | | |

The test is performed with the Eviews 5.1.1

The variance decomposition outputs are reported in Table 7.10.1. It was documented that the variance of domestic investment is always caused by 100 percent by itself in the first year. In the second year, the domestic investment variance is decomposed into its own variance (68.71%) followed by GDP growth rate (20.31), FDI (4.72%), financial intermediation (4.53%), real exports (0.38%), human capital (0.50%) and domestic credit availability (0.86%). However, in subsequent years, the share of GDP growth rates decline to approximately 57.58% followed by the volume of FDI, GDP growth rate, financial intermediation, real export, human capital and volume of domestic credit availability are increased to (7.52%, 18.45%, 4.05%, 5.23%, 4.22% and 2.94% respectively). On the other hand, the share of FDI in explaining the variation of domestic investment increases gradually from the second year, till the tenth year. Summarily, the changes in domestic investment are mainly caused by its own variation, which by the end of the tenth year it could accounted for below average value (i.e. 60%). The volatility of domestic investment is mainly caused by its own variation, as it always accounts for major portion (above 50%) of the fluctuations.

## 7.11 Model Diagnostics of the Domestic Investment Function

### 7.11.1 Results of L-M and B-G Tests

### Table 7.11.1.1: Results of Autocorrelation and Normality of the DI Function

| Tests | L-M Test Statistics | Probability | Conclusions |
|---|---|---|---|
| F-statistic | 1.339529 | 0.276263 | No Autocorrelation |
| Obs*R-squared | 3.167369 | 0.205218 | Normally Distributed |

The test is performed with the Eviews 5.1.1

Table 7.11.1.1 indicates the results of the autocorrelation of the estimated domestic investment equation. In case of equation (7.5.1), both the probability values are greater than 0.05. The F-statistic of the L-M test is 1.34 and the probability is 0.28 which greater than 0.05. That is, the null hypothesis of autocorrelation is rejected. Likewise, Breusch–Godfrey serial correlation test reveals no autocorrelation among the variables (Obs*R-squared 3.16769 with associated P-value 0.205). These imply that the estimated domestic investment equation does not suffer from autocorrelation problem as well as the residuals follow the normality of the distribution as the null hypotheses are rejected.

### 7.11.2 White General Heteroscedasticity Test

**Table 7.11.2.1: Results of the White General Heteroscedasticity Test**

| Tests | WGH Test Statistics | Probability | Conclusion |
|---|---|---|---|
| F-statistic | 2.494750 | 0.022704 | No Heteroscedasticity |
| Obs*R-squared | 21.18537 | 0.047731 | Normally Distributed |

The test is performed with the Eviews 5.1.1

Table 7.11.2.1 shows that the F-statistic of the White General Heteroscedasticy test is 2.49 with corresponding probability 0.023 which is less than the critical value (α) 0.05. This implies that the null hypothesis of no heteroscedasticity is accepted that is, the equation (7.5.1) is free from heteroscedasticity problem. The Breusch–Pagan-Godfrey test also reveals homoscedasticity (Obs*R-squared 21.19 with associated P-value 0.048) of the distribution.

### 7.11.3 Results of the Stability Test

It can be seen from the figures for equation (7.5.1) 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.

**Figure 7.11.3.1: Result of the CUSUM Test**

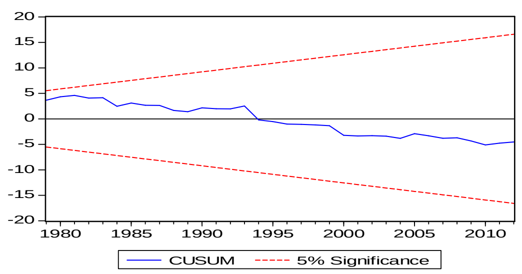
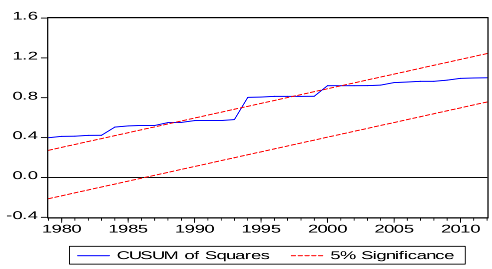



**Figure 7.11.3.2: Result of the CUSUMSQ Test**




The result of CUSUM test indicated by the Figure 7.11.3.1 shows that the statistic stays within the 95 percent confidence interval that is, there is no structural break of the model over the period. Figure 7.11.3.2 on the other hand, indicates that the statistics of

CUSUMSQ test begins from outside of the confidence interval but very soon it remains inside of the 95 percent confidence interval. These imply that estimates and the variation of the estimates of the model are stable over the period. Thus, no structural change is found in the model. Finally, it could be concluded that both the models are structurally stable and specified. So, these parameters could be used for policy purposes study safely.

### 7.12 Conclusion

The objective of this chapter is to estimate the domestic investment function in order to assess the infleucnes of the factors of domestic investment as well as to examine the causal relationships associated with them in Bangladesh. In this context, the trend of the variables and the pre-estimation techniques show that all the variables have the long run upward slopes, there is no structural breakpoint in 1990 in the data series of domestic investment; the data series are more instable during the pre-liberalization periods; the variables are positively correlated with domestic investment and finally, the data series of the function are normally distributed. The stationarity of the data have been examined by the unit root tests (the graphical test, the correlogram test, the Augmented Dickey-Fuller test, the D-F (GLS) test and the Phillips-Perron test) that are deemed equally valid in econometric study. Results indicate that the data of all variables are non-stationary at their levels but, they have been found stationary at the first difference that is, they are obviously integrated of order one *I(1)*. Results of Johansen Maximum Likelihood method show that there are two long run cointegrating relationships between domestic investment and its segregated factors as both the trace and max-eigen value statistics are significant for every case. The results of the OLS estimation show that the estimated coefficients of the domestic investment function indicate that domestic investment of Bangladesh is however influenced by its various factors but financial intermediation and human capital have the significantly negative effect on it. In contrast, GDP growth rate, FDI, real export and domestic credit have the positive impact on the domestic investment of Bangladesh. The Wald test confirms that some variables are individually significant for the domestic investment in Bangladesh.

VECM shows that the long run causalities exist between financial intermediation, real exports and the domestic investment in Bangladesh. The short run effects exist between the GDP growth rate, real exports and domestic investment in Bangladesh and the terms ECT indicate the long term causations go to the domestic investment from GDP growth rate and real exports. That is, there are short run dynamic adjustment to the long run equilibrium in

Bangladesh but, divergence with FDI, financial intermediation and domestic credit to domestic investment. The VAR results show that the elasticities of financial intermediation and human capital are negative but statistically insignificant. Real export and domestic credit are statistically elastic in the long run while others are positive but not statistically significant. The GDP growth rate, FDI and financial intermediations are statistically significant in the short run while real exports and human capital are negatively elastic to domestic investment in Bangladesh in the short run.

The Granger causality test indicates that there are bidirectional causalities between domestic investment and real export; as well as domestic investment and domestic credit availability in Bangladesh in the short run. That is, they cause each other to grow. Otherwise, there is unidirectional causality between the pair-wise variables of the domestic investment function. The impulse response analysis shows that the response of all independent variables is either positive or negative in the short run but in the long run they all are responded towards the domestic investment in Bangladesh. Finally, the model diagnostic tests confirm the robustness of the findings of domestic investment function for Bangladesh.

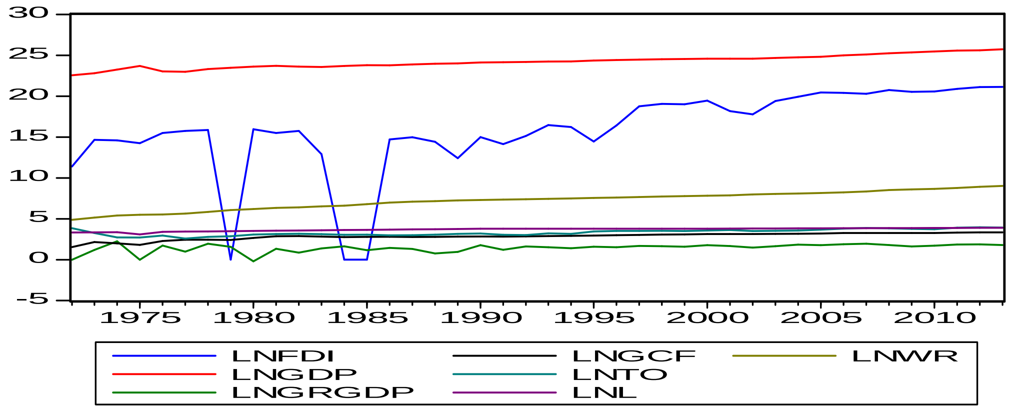
# Chapter Eight: Empirical Results of FDI Function

## 8. Introduction

It is necessary to estimate the foreign direct investment function in order to assess the infulences of different components on FDI as well as to examine the causal relationships associated with them at the disaggregated level. In this context, a complete econometric procedure has been carried out through this chapter so that the objectives are to be met up and the hypotheses are to be tested accordingly. In doing so, the pre-estimation techniques like, the Chow break point test, the Coppock instability index, the statistical description, the correlation matrix, the normality of the time series data have been examined first. The stationarity of the data, the long run cointegrated relationships have also been justified so that the function could be estimated to assess the impact of the factors on FDI. The short and long run elasticities, the causal relationships associated with the factors and the response of domestic investment to the factors have also been examined throughout this chapter. Besides, various post estimation model diagnostic tests that includes L-M test, B-G test, WGH test, the CUSUM and CUSUMSQ tests have been carried out for supporting the results.

## 8.1 Trend of the Variables of the FDI Function for Bangladesh

**Figure 8.1.1: Trend of the Variables of the FDI Function for Bangladesh (1972-2013)**




Note: Figure is drawn on the basis of the Table 8.1.1 (in Appendix)

Figure 8.1.1 shows that each of the variables has the upward trend over the period but slope of them are different. The trend of FDI is upward and increasing pattern but it is not as expected. The trend is very slow with high fluctuations. GDP line shows that there is a fresh upward rising trend over the period in Bangladesh but the growth rate of GDP is very much unstable up to 1990, and then remains a stable with little fluctuations. The gross capital formation and wage rate in Bangladesh have the fresh upward rising pattern. The degree of trade openness in Bangladesh is not satisfactory at all and it remains almost same over the period. The nature and the pattern of the variables of FDI function are however positive and upward trends over the period in Bangladesh.

## 8.2 Structural Changes of Foreign Direct Investment in Bangladesh

### 8.2.1 Result of the Chow Test

As the pre-estimation technique, the Chow test is conducted to measure the structural changes in the aggregate foreign direct investment in Bangladesh. The Chow test results are shown below:

**Table 8.2.1: Results of the Structural Breakpoint of the FDI Function**

| Chow Breakpoint Test: 1990 | | | |
|---|---|---|---|
| F-statistic | 1.708821 | Prob: (2, 42) | 0.147529 |
| Log likelihood ratio | 14.94017 | Prob: Chi-square (2) | 0.036774 |

Source: Estimated from the Table: 8.1.1 (in Appendix).

Table 8.2.1 shows that the test results confirm that there exists a structural breakpoint in 1990 in the series of foreign direct investment during the study period. Since, the calculated F-statistic is 1.708821 which is greater than the F-critical value thus the null hypothesis of no structural break point in 1990 is rejected and it is also confirmed by the p-value equals to 0.147529 which is also greater than any significance levels (α). Thus, there is a structural breaking point of foreign direct investment in Bangladesh in 1990. The likelihood ratio (LR) result is significant as the *p* value is less than significance level $\alpha = 0.05$. That is, there is a structural breaking point in the data series of FDI in Bangladesh.

### 8.2.2 Instability of Foreign Direct Investment in Bangladesh

The instability of domestic investment of Bangladesh is estimated by using Coppock Instability Index. The theory shows that the higher value of the Coppock Instability Index indicates the higher degree of instability.

**Table 8.2.2: Result of Coppock Instability Index of FDI in Bangladesh**

| Period | Coppock Instability Index (CII) in % |
|---|---|
| Pre-Liberalization | 27.81 |
| Post-Liberalization | 9.46 |
| Overall | 15.64 |

Source: Own estimated from the data of Table 8.1.1 (in Appendix).

Note: CII= [Antilog $\sqrt{Variance - 1}$ ]*100

Table 8.2.2 examines that the CII is 27.81 percent during the pre-liberalization regime and 9.46 percent during the Post-liberalization regime. Therefore, it is clear indication that the instability in FDI is higher during Pre-liberalization than Post-liberalization periods. The CII of Pre liberalization period is higher than that of during the overall study period (15.64 percent). That is, the data series of FDI suffer with instability problem and it is severe during pre-liberalization in Bangladesh.

### 8.2.3 Descriptive Statistics of FDI Function

**Table 8.2.3: Results of Descriptive Statistics of the FDI Function in Bangladesh**

| | lnfdi | lngdp | Lngrgdp | lngcf | lnto | lnl | Lnwr |
|---|---|---|---|---|---|---|---|
| Mean | 15.81 | 24.22 | 1.45 | 2.85 | 3.34 | 3.69 | 7.23 |
| Median | 15.91 | 24.20 | 1.61 | 2.88 | 3.24 | 3.79 | 7.42 |
| Maximum | 21.13 | 25.73 | 2.26 | 3.35 | 3.97 | 3.90 | 9.03 |
| Minimum | 0.00 | 22.56 | -0.20 | 1.55 | 2.59 | 3.09 | 4.88 |
| Std. Dev. | 5.18 | 0.79 | 0.53 | 0.42 | 0.38 | 0.19 | 1.10 |
| Skewness | -1.90 | 0.05 | -1.67 | -1.29 | 0.01 | -1.21 | -0.41 |
| Kurtosis | 6.73 | 2.42 | 5.63 | 4.42 | 1.91 | 3.80 | 2.26 |
| Jarque-Bera | 49.56 | 0.61 | 31.53 | 15.26 | 2.08 | 11.39 | 2.13 |
| Probability | 0.00 | 0.74 | 0.00 | 0.00 | 0.35 | 0.00 | 0.34 |
| Sum | 664.21 | 1017.09 | 60.71 | 119.88 | 140.10 | 155.13 | 303.75 |
| Sum Sq. Dev. | 1101.48 | 25.48 | 11.36 | 7.16 | 5.94 | 1.49 | 49.71 |
| Observations | 42 | 42 | 42 | 42 | 42 | 42 | 42 |

Source: Table 8.1.1 in (Appendix). The Test is performed with Eviews 5.1.
Note: Data have been rounded at 2 digits after decimal.

Table 8.2.3 indicates that the variables under study have been found normally distributed. The 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 except the variable FDI. The range of variation between maximum and minimum is also reasonable. 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 GDP, trade openness and wage rate variables are below 3 which confirms near normality. The Jarque-Bera test statistics also accept the null hypothesis of normal distribution of each variable, except two variables (lngdp and lnwr), with varying probabilities but they have been found normal at their first difference. The Sum and Sum Sq. Dev. ensures that there is no structural break of the data. Thus, the normality of the distribution is ensured in the study.

### 8.2.4 Correlation Matrix of FDI Function

**Table 8.2.4: Correlation among the Variables of FDI Function**

| | lnfdi | Lngdp | lngrgdp | lngcf | lnto | lnl | Lnwr |
|---|---|---|---|---|---|---|---|
| lnfdi | 1 | 0.60 | 0.28 | 0.50 | 0.57 | 0.46 | 0.56 |
| lngdp | 0.60 | 1 | 0.50 | 0.88 | 0.76 | 0.85 | 0.97 |
| lngrgdp | 0.28 | 0.50 | 1 | 0.54 | 0.31 | 0.55 | 0.52 |
| lngcf | 0.50 | 0.88 | 0.54 | 1 | 0.63 | 0.93 | 0.93 |
| lnto | 0.57 | 0.76 | 0.31 | 0.63 | 1 | 0.67 | 0.74 |
| lnl | 0.46 | 0.85 | 0.55 | 0.93 | 0.67 | 1 | 0.94 |
| lnwr | 0.56 | 0.97 | 0.52 | 0.93 | 0.74 | 0.94 | 1 |

Source: Table 8.1.1 (in Appendix). The Test is performed with Eviews 5.1.
*Data have been rounded within 2 digits after decimal.

Table 8.2.4 shows that the correlation between foreign direct investment and GDP is 0.60 while the correlations between foreign direct investment and GDP growth rate, gross capital formation, trade openness, stock of labour ratio of the total population and wage rate are 0.28, 0.50, 0.57, 0.46 and 0.56 respectively. The dependent variable *lnfdi* is positively related with all of the independent variables of the function as expected. It is consistent with the theory of foreign direct investment that it is the positive functions of GDP, GDP growth rate, trade openness, and stock of labour but negatively related with the gross capital formation and wage rate. The matrix further shows that gross capital formation and wage rate are also positively related with the FDI. This may be due to insignificant contributions of them to FDI inflows in Bangladesh.

## 8.3 Results of Unit Root Test of FDI Function

For econometric time series analysis it is necessary to test the data of the variables (*lnfdi, lngdp, lngrgdp, lngcf, lnto, lnl, and lnwr*) of FDI function first. Without stationarity of the data may mislead the results of the study. The unit root tests (with and without a trend) like the correlogram test, the ADF test, D-F (GLS) test and the Phillips-Perron test have been applied in this regard. The results of these tests are as follows:

### 8.3.1 Result of the Correlogram Test

**Table 8.3.1.1: Correlogram of Foreign Direct Investment (*lnfdi*) at the Level Form**

| Autocorrelation | Partial Correlation | Lag | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| . \|**** \| | . \|**** \| | 1 | 0.525 | 0.525 | 12.424 | 0.000 |
| . \|** \| | . \| . \| | 2 | 0.272 | -0.005 | 15.843 | 0.000 |
| . \|** \| | . \|*. \| | 3 | 0.202 | 0.084 | 17.770 | 0.000 |
| . \|** \| | . \|*. \| | 4 | 0.249 | 0.156 | 20.792 | 0.000 |
| . \|*** \| | . \|** \| | 5 | 0.382 | 0.256 | 28.087 | 0.000 |
| . \|*** \| | . \| . \| | 6 | 0.346 | 0.048 | 34.247 | 0.000 |
| . \|*. \| | .*\| . \| | 7 | 0.147 | -0.143 | 35.391 | 0.000 |
| . \| . \| | .*\| . \| | 8 | 0.021 | -0.093 | 35.414 | 0.000 |
| . \| . \| | . \| . \| | 9 | 0.013 | -0.038 | 35.424 | 0.000 |
| . \|*. \| | . \| . \| | 10 | 0.082 | 0.002 | 35.815 | 0.000 |
| . \| . \| | .*\| . \| | 11 | 0.043 | -0.117 | 35.927 | 0.000 |
| . \| . \| | . \|*. \| | 12 | 0.042 | 0.072 | 36.033 | 0.000 |
| . \| . \| | . \| . \| | 13 | -0.018 | 0.007 | 36.054 | 0.001 |
| .*\| . \| | .*\| . \| | 14 | -0.097 | -0.073 | 36.677 | 0.001 |

The Test is performed with Eviews 5.1.

Table 8.3.1.1 shows the sample correlogram of foreign direct investment (*lnfdi)* in Bangladesh. It shows the correlogram up to 14 lags. The striking feature of this sample correlogram is that it starts at high value (about 0.525 at lag 1) and then tapers off gradually. At lag 6 the autocorrelation coefficient is 0.346. This type of pattern is generally an indication that the time series is non-stationary. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance 1/n, where n is sample size. Since, the number of observation is *42*, implying a variance of *1/42* or about (*0.0238*) and the standard error is $\sqrt{0.0238} = 0.1543$. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1543)\,] = \pm\, 0.303$. The estimated coefficients up to lag 6 fall outside of the interval. This also implies that the null hypothesis cannot be rejected and the data series is non-stationary at the level. Similar results of correlogram test have been found for the rest of the variables (*lngdp, lngrgdp, lngcf, lnto, lnl and lnwr*) of FDI function that is, the data of these variables are also non-stationary at their level form. Thus, it is now the requirement of differencing data first for further test to have the stationarity of the data.

**Table 8.3.1.2: Correlogram Test of FDI *(Δlnfdi)* at the First Difference**

| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| **\| . \| | **\| . \| | 1 | -0.242 | -0.242 | 2.5834 | 0.108 |
| **\| . \| | **\| . \| | 2 | -0.214 | -0.289 | 4.6474 | 0.098 |
| .*\| . \| | **\| . \| | 3 | -0.137 | -0.317 | 5.5192 | 0.137 |
| .*\| . \| | ***\| . \| | 4 | -0.094 | -0.398 | 5.9385 | 0.204 |
| . \|** \| | .*\| . \| | 5 | 0.213 | -0.168 | 8.1619 | 0.148 |
| . \|*. \| | . \| . \| | 6 | 0.190 | 0.057 | 9.9881 | 0.125 |
| .*\| . \| | .*\| . \| | 7 | -0.167 | -0.088 | 11.437 | 0.121 |
| . \| . \| | . \| . \| | 8 | -0.052 | -0.006 | 11.583 | 0.171 |
| .*\| . \| | . \| . \| | 9 | -0.071 | -0.039 | 11.861 | 0.221 |
| . \|*. \| | . \|*. \| | 10 | 0.123 | 0.097 | 12.715 | 0.240 |
| . \| . \| | .*\| . \| | 11 | -0.051 | -0.132 | 12.870 | 0.302 |
| . \| . \| | .*\| . \| | 12 | 0.010 | -0.093 | 12.876 | 0.378 |
| . \| . \| | . \| . \| | 13 | 0.011 | -0.036 | 12.883 | 0.457 |
| . \| . \| | .*\| . \| | 14 | -0.029 | -0.064 | 12.937 | 0.532 |

The Test is performed with Eviews 5.1.

Table 8.3.1.2 shows the sample correlogram of FDI in the first difference. Since, the number of observation is *41* after first difference, implying a variance of *1/41* or about (*0.0244*) and the standard error is $\sqrt{0.0244} = 0.1562$. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1562)\,] = \pm\, 0.306$. All the estimated sample autocorrelation coefficients fall inside of the interval at the first difference. Therefore, the null hypothesis of non-stationarity can be rejected at 5% significance level because all the lag values fall inside the confidence interval. This implies that the series is stationary after the first difference because the unit root problem has been vanished then. Similar results of correlogram test have been found for the rest of the variables (*lngrgdp, lngdp, lngcf, lnto, lnl and lnwr*) of FDI function that is, the data of these variables are also stationary at their first difference. That is, they all are integrated of order one *I(1)*.

### 8.3.2 Result of the Augmented Dickey-Fuller (ADF) Unit Root Test

The Augmented Dickey- Fuller test is popularly used to test for the existence of unit roots and to determine the order of integration of the variables. The tests are done both with and without a time trend. Results are shown by the following table.

**Table 8.3.2.1: Result of the Augmented Dickey-Fuller (ADF) Unit Root Test**

| Variables | Lag | With An Intercept but Not A Trend | | | | | With An Intercept and A Linear Trend | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ADF Statistic | Crit. Value (1%) | Crit. Value (5%) | $R^2$ Value | *d* Value | ADF Statistic | Crit. Value (1%) | Crit. Value (5%) | $R^2$ Value | *d* Value |
| lnfdi | 1 | -3.2676 | -3.6009 | -2.9350 | 0.2149 | 2.0182 | -4.5358 | -4.1985 | -3.5236 | 0.3513 | 1.8867 |
| lngdp | 3 | 2.4210 | -3.6156 | -2.9411 | 0.5469 | 0.9638 | -0.7696 | -4.2191 | -3.5331 | 0.5629 | 0.8543 |
| lngrgdp | 5 | -1.0667 | -3.6210 | -2.9434 | 0.6291 | 1.7944 | -4.0975 | -4.2349 | -3.5403 | 0.7547 | 1.6652 |
| lngcf | 1 | -3.5544 | -3.6010 | -2.9350 | 0.2447 | 1.8987 | -4.7443 | -4.1985 | -3.5236 | 0.4148 | 1.6899 |
| lnto | 1 | -1.1188 | -3.6056 | -2.9369 | 0.0716 | 2.3545 | -7.3960 | -4.1985 | -3.5236 | 0.6216 | 1.9680 |
| lnl | 1 | -1.6083 | -3.6056 | -2.9369 | 0.2538 | 2.2119 | -1.6680 | -4.2050 | -3.5266 | 0.2780 | 2.1405 |
| lnwr | 0 | -3.3075 | -3.6010 | -2.9350 | 0.2191 | 1.0043 | -3.5363 | -4.1985 | -3.5236 | 0.3615 | 1.0757 |
| Δlnfdi | 1 | -6.3988 | -3.6105 | -2.9389 | 0.6540 | 2.1871 | -6.3271 | -4.2119 | -3.5298 | 0.6551 | 2.1900 |
| Δlngdp | 1 | -7.4781 | -3.6105 | -2.9389 | 0.6412 | 2.3356 | -7.3982 | -4.2117 | -3.5298 | 0.6459 | 2.3684 |
| Δlngrgdp | 1 | -10.904 | -3.6105 | -2.9389 | 0.8856 | 1.6652 | -10.742 | -4.2119 | -3.5298 | 0.8864 | 1.6768 |
| Δlngcf | 1 | -7.7488 | -3.6105 | -2.9390 | 0.6365 | 1.4481 | -9.0594 | -4.2119 | -3.5298 | 0.7109 | 1.5834 |
| Δlnto | 1 | -6.1999 | -3.6056 | -2.9369 | 0.5029 | 2.3692 | -6.0794 | -4.2050 | -3.5266 | 0.5091 | 2.3287 |
| Δlnl | 1 | -9.9968 | -3.6056 | -2.9369 | 0.7245 | 2.1974 | -6.5589 | -4.2119 | -3.5298 | 0.7491 | 1.4292 |
| Δlnwr | 1 | -4.1980 | -3.6056 | -2.9369 | 0.3168 | 1.9213 | -4.6680 | -4.2118 | -3.5298 | 0.4023 | 1.9020 |

The test is conducted using Eviews 5.1;
Note: 95% critical value for the Augmented Dickey – Fuller statistic=-2.9665
* Critical values (5%) are from Mackinnon (1991).

Where, *lnfdi* = foreign direct investment; *lngdp* = output of the country used as the proxy of economic growth; *lngrgdp* = growth rate of GDP; *lngcf* = gross fixed capital formation; *lnto* = trade openness; *lnl* = labour force ratio to the total population; *lnwr* = general wage rate. *Δ*= First Difference, Critical values (5%) are from Mackinnon (1991).

Table 8.3.2.1 presents the level values as non-stationary because the calculated values are lower than the critical values in absolute term. The null hypothesis could not be rejected then. Table further 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 have been rejected. Thus, the data have been stationary after the first difference. Therefore, the null hypothesizes of unit root problems have been accepted in the level. But the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data series becomes stationary for the integration of order one *I(1)*.Table again shows the adjustment coefficient $R^2$ (the goodness of fit) that indicates the data adjustment provides a high rates of fit for the data series after the first difference whereas, they are insignificant in the level form. The Durbin Watson *d* statistic indicates that that each of data series contains a high level autocorrelation in the level form but the autocorrelation problems have been reduced significantly from many of the data series in the first difference.

### 8.3.3 Results of the D-F (GLS) Test

**Table 8.3.3.1: The Result of D-F (GLS) Test of FDI Function**

| Variables | Lag | With An Intercept but not A Trend | | | With An Intercept and A Linear Trend | | |
|---|---|---|---|---|---|---|---|
| | | D-F (GLS) Statistic | Critical Value (1%) | Critical Value (5%) | D-F (GLS) Statistic | Critical Value (1%) | Critical Value (5%) |
| lnfdi | 5 | -0.4092 | -2.6290 | -1.9501 | -4.6399 | -3.7700 | -3.1900 |
| lngdp | | 0.8565 | -2.6226 | -1.9491 | -3.5109 | -3.7700 | -3.1900 |
| lngrgdp | 1 | -1.5246 | -2.6241 | -1.9493 | -7.0924 | -3.7700 | -3.1900 |
| lngcf | 1 | -0.5067 | -2.6226 | -1.9491 | -2.4657 | -3.7700 | -3.1900 |
| lnto | 1 | -1.3221 | -2.6241 | -1.9493 | -1.9974 | -3.7700 | -3.1900 |
| lnl | 1 | -0.1618 | -2.6241 | -1.9493 | -1.6440 | -3.7700 | -3.1900 |
| lnwr | 1 | 1.3025 | -2.6241 | -1.9493 | -1.2884 | -3.7700 | -3.1900 |
| Δlnfdi | 1 | -7.4489 | -2.6241 | -1.9493 | -6.1721 | -3.7700 | -3.1900 |
| Δlngdp | 1 | -5.1401 | -2.6241 | -1.9493 | -6.3831 | -3.7700 | -3.1900 |
| Δlngrgdp | 1 | -3.2668 | -2.6256 | -1.9496 | -9.8987 | -3.7700 | -3.1900 |
| Δlngcf | 1 | -2.5121 | -2.6241 | -1.9493 | -4.6815 | -3.7700 | -3.1900 |
| Δlnto | 1 | -1.6805 | -2.6256 | -1.9496 | -4.2600 | -3.7700 | -3.1900 |
| Δlnl | 1 | -10.1274 | -2.6241 | -1.9493 | -6.7000 | -3.7700 | -3.1900 |
| Δlnwr | 1 | -2.1399 | -2.6241 | -1.9493 | -3.3057 | -3.7700 | -3.1900 |

The test is conducted with Eviews 5.1.
Note: 95% critical value for the Augmented Dickey - Fuller statistic=-2.9665
* Critical values (5%) are from Mackinnon (1991).

Table 8.3.3.1 indicates that the time series data of FDI function have however been non-stationary at the level form because the D-F (GLS) statistics are less than their critical values at both 1 and 5 percent level of significance. Therefore, the null hypothesizes of unit root problems have been accepted. 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)*.

### 8.3.4 Result of Phillips-Perron Test

**Table 8.3.4.1: Result of the Phillips-Perron Unit Root Test**

| Variables | With An Intercept but Not A Trend | | | With An Intercept and A Linear Trend | | |
|---|---|---|---|---|---|---|
| | PP Statistic | Critical Value (1%) | Critical Value (5%) | PP Statistic | Critical Value (1%) | Critical Value (5%) |
| lnfdi | -3.2102 | -3.6010 | -2.9350 | -4.4352 | -4.1985 | -3.5236 |
| lngdp | -0.8804 | -3.6010 | -2.9350 | -4.0449 | -4.1985 | -3.5236 |
| lngrgdp | -6.8190 | -3.6010 | -2.9350 | -11.4151 | -4.1985 | -3.5236 |
| lngcf | -3.9678 | -3.6010 | -2.9350 | -4.9422 | -4.1985 | -3.5236 |
| lnto | -1.6510 | -3.6010 | -2.9350 | -7.3837 | -4.1985 | -3.5236 |
| lnl | -1.6816 | -3.6010 | -2.9350 | -2.4292 | -4.1985 | -3.5236 |
| lnwr | -2.8275 | -3.6010 | -2.9350 | -3.1920 | -4.1985 | -3.5236 |
| Δlnfdi | -14.5056 | -3.6010 | -2.9350 | -15.2190 | -4.1985 | -3.5236 |
| Δlngdp | -11.0380 | -3.6010 | -2.9350 | -10.8639 | -4.1985 | -3.5236 |
| Δlngrgdp | -49.3116 | -3.6010 | -2.9350 | -53.2653 | -4.1985 | -3.5236 |
| Δlngcf | -10.7942 | -3.6010 | -2.9350 | -17.5229 | -4.1985 | -3.5236 |
| Δlnto | -6.4890 | -3.6010 | -2.9350 | -6.2759 | -4.1985 | -3.5236 |
| Δlnl | -11.1300 | -3.6056 | -2.9369 | -14.1148 | -4.2050 | -3.5266 |
| Δlnwr | -4.1785 | -3.6010 | -2.9350 | -4.0352 | -4.1985 | -3.5236 |

The test is conducted with Eviews 5.1.

Table 8.3.4.1 presents the level values as non-stationary because the t-values are less than their calculated values in absolute term. The null hypothesis could not be rejected then. It indicates that the non-stationarity problem has been vanished after first difference of the data because the PP statistics are greater than their critical values at 1% and 5% level of significance. It can be said that the first difference of FDI and its various components do not have unit root problem and the data series are stationary. These suggest that the series are integrated of order one *I(1)*.

Thus, the time series data of FDI function have been non-stationary at the level form because the tests statistics are less than their critical values. Therefore, the null hypothesizes of unit root problems have been accepted and the data suffers with unit root problem. But the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data of FDI function becomes stationary for the integration of order one *I(1)*.

### 8.4 Result of the Cointegration Test

Cointegration test clarifies the existence of long run equilibrium relationship between the variables. Cointegration method usually uses two test statistics for testing the cointegration: the trace ($T_r$) test and the max-eigen value ( $\lambda_{\max}$ ) test. The results of the cointegration test are shown by the Table 8.4.1 to 8.4.6.

**Table 8.4.1: Cointegration Result between FDI and GDP in Bangladesh**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistics | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6407 | 68.4022 | 15.4947 | 0.0000 | 39.9243 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5182 | 28.4780 | 3.8415 | 0.0000 | 28.4780 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.
The trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.

Table 8.4.1 explains the trace and max-eigen value statistics for foreign direct investment ($\Delta$*lnfdi*) and GDP in Bangladesh ($\Delta$*lngdp*) are 68.40 and 39.92 for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. In the second row of the table, the trace and max-eigen value statistics both are also greater than the critical values at 5 % (with 0.0000 probability) significance level. Hence, the null hypothesis of no cointegration is also rejected. Thus, there are 2 (two) cointegrating stable relations between foreign direct investment and the GDP growth in Bangladesh. Results also show that the null hypothesis of at most two cointegrating vectors ($H_0$: r <= 0 and $H_0$: r <= 1) are rejected at 5% level of significance, according to both the trace and max-eigen value statistics. This implies that these variables are cointegrated with two cointegrating equations.

**Table 8.4.2: Cointegration Result between FDI and GDP Growth Rate**

| $H_0$ | $H_A$ | Eigen Value | Trace Stat. | 5% Crit. Value | Probability** | Max. Eigen Value | 5% Crit. Val. | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.7551 | 80.6199 | 15.4947 | 0.0000 | 54.8702 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.4833 | 25.7497 | 3.8415 | 0.0000 | 25.7497 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.
The trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.

Table 8.4.2 shows that the trace and max-eigen value statistics for foreign direct investment ($\Delta$*lnfdi*) and GDP growth rate ($\Delta$*lngrgdp*) are 80.62 and 54.87 for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. In the second row, the trace and max-eigen value statistics are also greater than the critical values at 5 % (with 0.0000 probability) significance level. Hence, the null hypothesis of no cointegration is rejected. Hence, there are 2 (two) cointegrating stable relations between foreign direct investment and GDP growth rate in Bangladesh.

**Table 8.4.3: Cointegration Result between FDI and Gross Capital Formation**

| $H_0$ | $H_A$ | Eigen Value | Trace Stat. | 5% Crit. Value | Probability** | Max-Eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6273 | 66.0503 | 15.4947 | 0.0000 | 38.4934 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5067 | 27.5569 | 3.8415 | 0.0000 | 27.5569 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.

Table 8.4.3 states that the trace and max-eigen value statistics for foreign direct investment ($\Delta$*lnfdi*) and gross capital formation ($\Delta$*lngcf*) are 66.05 and 38.49for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. In the second row of the table, the trace and max-eigen value statistics are also greater than the critical values. Hence, the null hypothesis of no cointegration is also rejected and the alternative hypothesis of cointegrating relation is accepted. Thus, there are 2 (two) cointegrating long run stable relations between foreign direct investment and gross capital formation in Bangladesh.

**Table 8.4.4: Cointegration Result between FDI and Trade Openness**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-Eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6244 | 67.5366 | 15.4947 | 0.0000 | 38.1866 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5289 | 29.3500 | 3.8415 | 0.0000 | 29.3500 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1

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

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

Table 8.4.4 finds that the trace and max-eigen value statistics for foreign direct investment ($\Delta$*lnfdi*) and trade openness ($\Delta$*lnto*) are 67.54 and 38.19for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. In the second row, the trace and max-eigen value statistics are also greater than the critical values at 5 % (with 0.0000 probability) significant level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegrating relation is accepted. Hence, there are 2 (two) cointegrating long run stable relations between foreign direct investment and trade openness in Bangladesh.

**Table 8.4.5: Cointegration Result between FDI and Stock of Labour**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% crit. Value | Probability** | Max-eigen Value | 5% crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6352 | 57.5440 | 15.4947 | 0.0000 | 39.3252 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.3732 | 18.2188 | 3.8415 | 0.0000 | 18.2188 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1

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

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

Table 8.4.5 discusses that the trace and max-eigen value statistics for foreign direct investment ($\Delta$*lnfdi*) and stock of labour ($\Delta$*lnl*) are 57.54 and 39.33for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% (with 0.0000 probability) levels of significance in the first row. In the second, the trace and max-eigen value statistics are also greater than the critical values at 5 % (with 0.0000 probability) significant level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegrating relation is accepted. Thus, there are 2 (two) cointegrating stable relations between foreign direct investment and stock of labour.

**Table 8.4.6: Cointegration between Foriegn Direct Investment and Wage Rate**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% crit. Value | Probability** | Max-eigen Value | 5% crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6386 | 57.4836 | 15.4947 | 0.0000 | 39.6970 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.3662 | 17.7866 | 3.8415 | 0.0000 | 17.7866 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1

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

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

Table 8.4.6 shows that the trace and max-eigen value statistics for foreign direct investment ($\Delta lnfdi$) and wage rate ($\Delta lnwr$) are 57.48and 39.70for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance in the first row. In the second row of the table, the trace and max-eigen value statistics are also greater than the critical values at 5 % (with 0.0000 probability) significant level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Thus, there are 2 (two) cointegrating stable relations between foreign direct investment and wage rate in Bangladesh. The results are also supported by the graphical presentation.

**Figure 8.4.1: Cointegrated Relationships between FDI and Its Various Components**

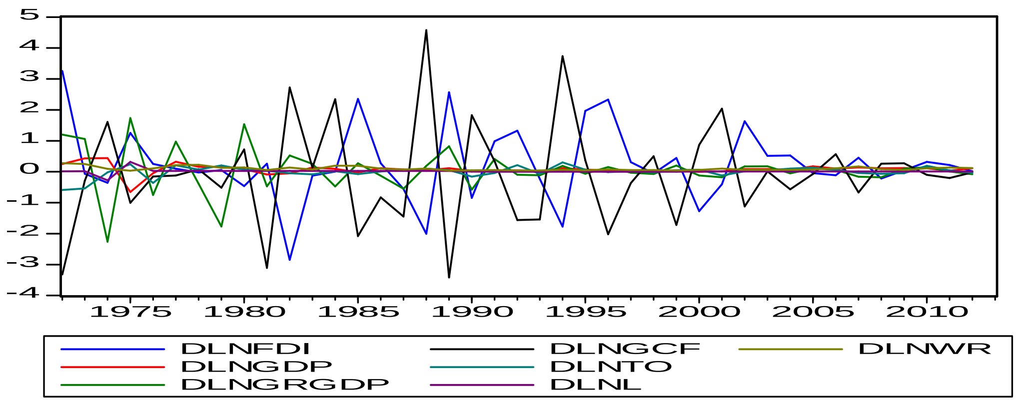



Figure 8.4.1 presents that there are long run cointegrated relationships between FDI *(Δlnfdi)* and its different components such as GDP (*Δ*lngdp), GDP growth rate (*Δlngrgdp*), gross capital formation (*Δlngcf*), trade openness (*Δlnto*), stock of labour (*Δlnl*), and wage rate *(Δlnwr)*. There are slow rates of fluctuations in the lines shown by the figure indicate that they all are moving towards the right. The FDI and GDP growth rate lines are very much fluctuated to the right but they also moves to the steady path in the long run. The GDP, gross capital formation, labour and the wage rate lines are steadier and they move to the right path in the long run. Thus, the lines indicated by the following figure are converging each other over the periods.

The cointegration test results therefore, indicate that there are 2 (two) cointegrating long run relationship between the pair-wise variables of the FDI function. Since the data are stationary at the first difference, the cointegrated relationships of the differenced variables have been justified and they all have been contegrated in the long run. Therefore, there are two cointegrating equations among the variables and they are converging each other in the long run.

## 8.5 Estimation of Foreign Direct Investment Function

Since all variables are cointegrated each other, the function follows the properties of ordinary least squares (OLS) method. It is therefore, very much convenient to estimate the function (6.2.2.2) with the OLS method. In this case, the software Eviews-5.1 has been conducted. The estimated function is as follows:

$$\Delta \ln fdi = 0.1343 - 1.0520\,\Delta \ln gdp + 0.2792\,\Delta \ln grgdp - 0.5359\,\Delta \ln gcf * -$$
$$0.0494\,\Delta \ln to - 3.6542\,\Delta \ln l + 1.8638\,\Delta \ln wr .......... .......... .......... .........(8.5.1)$$

(0.267981) (1.629875) (0.243090) (0.078484) (0.855413) (4.184792) (2.878517)

[0.501009] [-0.645439] [1.148393] [-6.827668] [ -0.057755] [-0.873212] [0.647473]

Note: Brackets indicate the standard error of the statistics while *t*-values are shown by the parentheses.

The estimated coefficients of the FDI function (*8.5.1*) indicate that they all are related with FDI; the relations may be positive or negative. FDI inflows in Bangladesh are no doubt influenced by its various factors but the gross capital formation significantly negatively affects FDI. That is, an increase in gross capital formation, FDI will be decreased by 5 percent. GDP growth rate and wage rate in Bangladesh again positively affect FDI of Bangladesh by 3 and 1.9 percent respectively but they are insignificant. FDI in Bangladesh is also negatively influenced by the GDP, stock of labour and trade openness but the effects are insignificant. That is, GDP, gross capital formation, trade openness and stock of labour affect FDI negatively of which gross capital formation is significant. In contrast, GDP growth rate and wage rate in Bangladesh affect FDI positively.

### 8.5.1 Result of the Wald Test

**Table 8.5.1.1: Result of the Wald Test of Coefficients of Restrictions**

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| F-statistic | 11.15650 | (2, 34) | 0.0002 |
| Chi-square | 22.31300 | 2 | 0.0000 |
| Null Hypothesis Summary: | | | |
| Normalized Restriction (= 0) | | Value | Std. Err. |
| C(1) | | 0.134261 | 0.267981 |
| C(3) - 2*C(4) | | 1.350886 | 0.286056 |

The Test is performed with Eviews- 5.1.
Note: Restrictions are linear in coefficients.

Table 8.5.1.1 indicates the Wald test of foreign direct investment function which 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. That is, the critical values of both F-statistic and Chi-square test are less than the calculated values that ensure the rejection of the null hypothesis of insignificant coefficients. The table indicates that the variables are significant at both 0.05 and 0.01 levels for the foreign direct investment function in Bangladesh.

### 8.6 Long Run Causality Test for VECM of FDI Function

If two variables are cointegrated with same order, there must exist an Error Correction Mechanism (ECM/VECM). The estimated coefficient of error correction term shows the long run effect and the estimated coefficient of lagged variables shows the short run effect. The cointegrating long run error correction results are shown by the following Table 8.6.1 to Table 8.6.6.

**Table 8.6.1: Result of VECM for FDI and GDP in Bangladesh (*Δlnfdi, Δlngdp*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnfdi_t$ | 1 | | 0.020957**<br>(0.00315)<br>[ 6.66000] |
| $\Delta lngdp_{1t}$ | -87.78213*<br>(9.05427)<br>[-9.69510] | 0.628019*<br>(0.18943)<br>[ 3.31539] | |
| Constant | 5.304860 | -0.361791<br>(0.93995)<br>[-0.38491] | |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic. ** denotes the rejection of the hypothesis at 1 percent significance level.* denotes rejection of the hypothesis at 5 percent significance level.

Table 8.6.1 shows that the coefficient of the variable (*$\Delta lngdp_{1t}$*) is -87.78, which is negative but significant at 5 percent level. Such magnitude implies that an increase in GDP will increase foreign direct investment significantly in the long run. The short run coefficient of (*$\Delta lngdp_{1t}$*) is positive and statistically significant at 5 percent level. This implies that 1 percent increase in GDP; foreign direct investment will increase by 63 percent in the short run. Since, the coefficient of ECT is positive and statistically significant, it can be said that causation goes from FDI to GDP. That is, there is short run dynamic adjustment to the long run divergence between GDP and FDI in Bangladesh.

**Table 8.6.2: Result of VECM for FDI and GDP Growth Rate (*Δlnfdi, Δlngrgdp*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnfdi_t$ | 1 | | |
| $\Delta lngrgdp_{1t}$ | 11.01316*<br>(1.67890)<br>[ 6.55974] | -0.868775*<br>(0.27713)<br>[-3.13487] | |
| Constant | -0.059433 | 0.025228<br>(0.08326)<br>[ 0.30300] | -0.019233<br>(0.03461)<br>[-0.55568] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic. ** denotes the rejection of the hypothesis at 1 percent significance level * denotes rejection of the hypothesis at 5 percent significance level.

Table 8.6.2 finds that the coefficient of the variable (*Δlngrgdp$_{1t}$*) is 11.01, which is positive and significant at 5 percent level. This implies that an increase in GDP growth rate will increase foreign direct investment significantly in the long run by 11.01 percent. The short run coefficient of (*Δlngdp$_{1t}$*) is negative but statistically significant at 5 percent level. This implies that 1 percent increase in GDP growth rate; foreign direct investment will increase by 87 percent in the short run. The coefficient of ECT is statistically insignificant, it can be said that there is no causation between FDI and GDP growth rate in the long run but there is as cope of short run dynamics to the long run equilibrium.

**Table 8.6.3: Result of VECM for FDI and Gross Capital Formation (*Δlnfdi, Δlngcf*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lndi_t$ | 1 | | |
| $\Delta lngcf_{1t}$ | 10.30970<br>(6.79151)<br>[ 1.51803] | -0.329959*<br>(0.10544)<br>[-3.12921] | |
| Constant | -0.535743 | -0.001175<br>(0.01308)<br>[-0.08984] | -0.012725**<br>(0.00581)<br>[-2.18916] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic. ** denotes the rejection of the hypothesis at 1 percent significance level. * denotes rejection of the hypothesis at 5 percent significance level.

Table 8.6.3 states that the coefficient of variable *(Δlngcf$_{it}$)* is 10.31, it is positive but insignificant at 5 percent level. That is, an increase in GDP will not significantly change foreign direct investment in the long run. The short run coefficient of (*Δlngcf$_t$*) is negative but statistically significant at 5 percent level. This implies that 1 percent increase in gross capital formation; foreign direct investment will be increased by 33 percent in the short run. The coefficient of error term is negative but significant, it can be said that causation goes from gross capital formation to FDI. That is, there is short run dynamic adjustment to the long run equilibrium by 2 percent between gross capital formation and FDI in Bangladesh.

**Table 8.6.4: Result of VECM for FDI and Trade Openness (*Δlnfdi, Δlnto*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnfdi_t$ | 1 | | |
| $\Delta lnto_{1t}$ | -22.01451*<br>(5.32443)<br>[-4.13462] | -0.261327<br>(0.16774)<br>[-1.55794] | |
| Constant | 0.547433 | 0.004742<br>(0.02541)<br>[ 0.18665] | 0.028446**<br>(0.00946)<br>[ 3.00627] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic. ** denotes the rejection of the hypothesis at 1 percent significance level. * denotes rejection of the hypothesis at 5 percent significance level.

In Table 8.6.4, the coefficient of variable (*Δlnto$_{1t}$*) is -22.02, which is negative but significant at 5 percent level. That is, an increase in trade openness, FDI will be increased by 22.00 percent. The short run coefficient of (*Δlnto$_{1t}$*) is also negative but statistically insignificant at 5 percent level. Since, the coefficient of ECT is positive and statistically significant at both 5 and 1 percent significant level, it can be said that causation goes from FDI to trade openness. That is, there is short run dynamic adjustment with long run divergence between trade openness and FDI in Bangladesh.

**Table 8.6.5: Result of VECM for FDI and Stock of Labour (*Δlnfdi, Δlnl*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnfdi_t$ | 1 | | |
| $\Delta lnl_{1t}$ | 276.5071** (38.0379) [ 7.26926] | 0.345289 (0.19619) [ 1.76001] | |
| Constant | -4.022257 | 0.007326 (0.00638) [ 1.14894] | -0.006791** (0.00096) [-7.10437] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic. ** denotes the rejection of the hypothesis at 1 percent significance level.* denotes rejection of the hypothesis at 5 percent significance level.

Table 8.6.5 presents the coefficient of the variable (*Δlnl$_{1t}$*) which is 276.51. It is positive but statistically significant at both 5 and 1 percent levels. The short run coefficient of (*Δlnl$_{1t}$*) is positive but statistically insignificant at 5 percent level. Since, the coefficient of ECT is negative and statistically significant, it can be said that there is causation goes stock of labour to FDI between FDI and stock of labour in Bangladesh. That is, there is short run dynamic adjustment to the long run equilibrium between stock of labour and FDI in Bangladesh.

**Table 8.6.6: Result of VECM for FDI and Wage Rate (*Δlnfdi, Δlnwr*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnfdi_t$ | 1 | | |
| $\Delta lnwr_{1t}$ | 1.525494 (7.65897) [ 0.19918] | -0.082391 (0.15104) [-0.54550] | |
| Constant | -0.312142 | -0.000681 (0.00807) [-0.08442] | -0.000107 (0.00426) [-0.02513] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic. ** denotes the rejection of the hypothesis at 1 percent significance level. * denotes rejection of the hypothesis at 5 percent significance level.

In Table 8.6.6, the coefficient of variable (*Δlnwr$_{1t}$*) is 1.53, which is positive and insignificant at 5 percent level. Such magnitude implies that an increase in GDP will not change significantly foreign direct investment in the long run. The short run coefficient of (*Δlngdp$_{1t}$*) is negative but statistically insignificant at 5 percent level. Since, the coefficient of ECT is negative and t-statistic is statistically insignificant, it can be said that causation does not go from wage rate to FDI in Bangladesh. But, there is a scope of short run dynamic adjustment to the long run equilibrium between FDI and wage rate.

Thus, the long run relationships exist between FDI and GDP, FDI and trade openness, FDI and stock of labour in Bangladesh. The short run relationships exist between FDI and GDP growth rate, FDI and gross capital formation whereas, the VECM term of the FDI function is significant for GDP, gross capital formation and stock of labour in Bangladesh that means there is short term equilibrium with long term dynamics between these pair-wise variables.

### 8.7 Result of VAR Model for FDI Function

According to the theory of elasticity, it is known to all that the coefficients of the cointegrating equation with log value is known as the long term elasticity of the function. The lag differenced VAR coefficients are known as short run elasticity of the function.

**Table 8.7.1: Long and Short Run Elasticities of the FDI Function in Bangladesh**

| Elasticity | Constant | Δlngdp | Δlngrgdp | Δlngcf | Δlnto | Δlnl | Δlnwr |
|---|---|---|---|---|---|---|---|
| Long-run | 0.134261 | -1.051985 | 0.279162 | -0.535862* | -0.049404 | -3.654209 | 1.863761 |
| | (0.267981) | (1.629875) | (0.243090) | (0.078484) | (0.855413) | (4.184792) | (2.878517) |
| | [0.501009] | [-0.645439] | [1.148393] | [-6.827668] | [-0.057755] | [-0.873212] | [0.647473] |
| Short-run | -227.4424 | 1.389885** | 0.167342 | 1.168322** | 0.327656 | -0.807822* | 1.120773** |
| | (248.278) | (0.17254) | (0.22449) | (0.15424) | (0.19535) | (0.18941) | (0.19662) |
| | [-0.91608] | [ 8.05547] | [ 0.74544] | [ 7.57449] | [ 1.67726] | [-4.26488] | [ 5.70023] |

The test is performed with Eviews 5.1.
Note: ** Statistically significant at 1 percent level of significance. * Significant at 5 percent level.
The standard error is shown in the brackets and the t-statistics are shown by the parenthesis.

Table 8.7.1 explains that the first row of the table indicates the long term elasticity of the FDI *($\Delta lnfdi_t$)* function because it contains the coefficients of the log values of the estimated function. The table shows that the elasticity of the gross capital formation is significant at both 1 and 5 percent level of significance that means, an increase in gross capital formation may decrease FDI inflows by 54 percent in the long run. The coefficients of the independent lag differenced values are the short term elasticity of the foreign direct investment function *($\Delta lnfdi_t$)* shown in the second row. Table further shows that the coefficients of the GDP, gross capital formation, stock of labour and the wage rate are statistically significant at both 5 and 1 percent level of significance. The GDP and gross capital formation are positively related while the stock of labour and the wage rate in Bangladesh are negatively related with FDI *($\Delta lnfdi_t$)* in the short run. Therefore, long run significant elasticity exists between gross capital formation and the foreign direct investment in Bangladesh. The short run elasticities of the GDP, gross capital formation, stock of labour and wage rate in Bangladesh to the foreign direct investment are significant either they may be positive or negative.

### 8.8 Result of the Granger Causality Test

Accordingly, the causality model has been estimated and that has been tested by F-statistics. If F-statistic is statistically significant, the null hypothesis is rejected, otherwise accepted. Ganger causality is estimated using different lag and the results are presented by the following table:

**Table 8.8.1: Results of Pair-wise Granger Causality Test of FDI Function**

| Null Hypothesis | Obs. | Lag | F-Statistic | Probability | Decisions |
|---|---|---|---|---|---|
| $\Delta lngdp$ does not Granger Cause $\Delta lnfdi$ | | 3 | 3.89854 | 0.01792 | Rejected** |
| $\Delta lnfdi$ does not Granger Cause $\Delta lngdp$ | 38 | | 0.65980 | 0.58302 | Accepted |
| $\Delta lngrgdp$ does not Granger Cause $\Delta lnfdi$ | | 3 | 6.78164 | 0.00120 | Rejected** |
| $\Delta lnfdi$ does not Granger Cause $\Delta lngrgdp$ | 38 | | 2.50089 | 0.07773 | Rejected* |
| $\Delta lngcf$ does not Granger Cause $\Delta lnfdi$ | | 3 | 2.37408 | 0.08921 | Rejected* |
| $\Delta lnfdi$ does not Granger Cause $\Delta lngcf$ | 38 | | 0.54095 | 0.65784 | Accepted |
| $\Delta lnto$ does not Granger Cause $\Delta lnfdi$ | | 3 | 2.66555 | 0.06506 | Rejected* |
| $\Delta lnfdi$ does not Granger Cause $\Delta lnto$ | 38 | | 0.25759 | 0.85534 | Accepted |
| $\Delta lnl$ does not Granger Cause $\Delta lnfdi$ | | 2 | 0.40216 | 0.67201 | Accepted |
| $\Delta lnfdi$ does not Granger Cause $\Delta lnl$ | 39 | | 2.89878 | 0.06880 | Rejected* |
| $\Delta lnwr$ does not Granger Cause $\Delta lnfdi$ | | 2 | 0.49097 | 0.61630 | Accepted |
| $\Delta lnfdi$ does not Granger Cause $\Delta lnwr$ | 39 | | 2.96132 | 0.06522 | Rejected* |

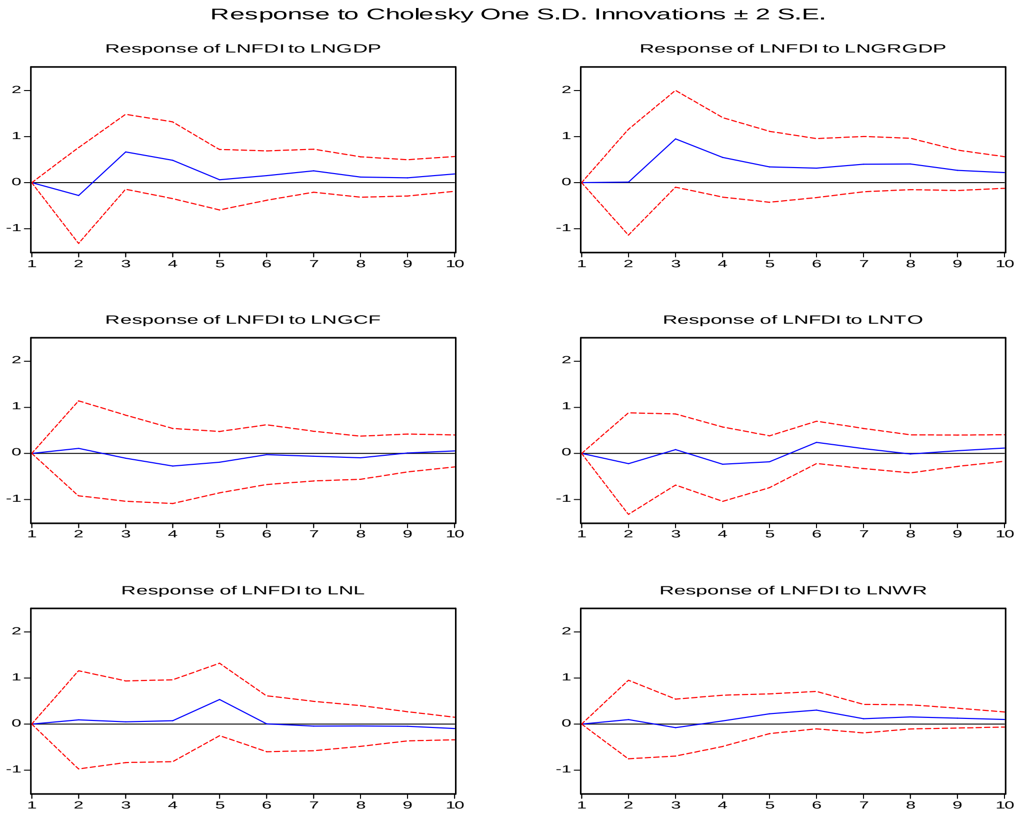
Source: Table 8.1.1 (in Appendix) with first difference data. The tests are performed with Eviews 5.1.
Note: * indicates the significance of null hypothesis at 0.05 levels, ** indicates the significance of the null hypothesis at 0.01 levels.

Table 8.8.1 shows that GDP causes FDI as F-statistics is significant. That is, causation goes from GDP to FDI in Bangladesh while FDI does not Granger cause GDP as the null hypothesis is accepted. Since, F statistic is statistically significant 5 and 1 percent level of significance for GDP growth rate and FDI as both the hypotheses are rejected. That is, the GDP growth rate and FDI in Bangladesh cause each other to grow at the same direction. Gross capital formation Granger causes foreign direct investment as the null hypothesis of GCF does not cause FDI is rejected at 0.01 and 0.05 levels while the F-statistics is insignificant for FDI to gross capital formation in Bangladesh. That is, GCF Granger causes FDI to grow, but FDI does not cause GCF to grow in Bangladesh. Trade openness in Bangladesh causes FDI to grow as the null hypothesis is rejected at 0.05 levels but FDI does not Granger cause trade openness because F-statistics is insignificant that is, the null hypothesis is accepted. Table further shows that labour force of Bangladesh does not Granger cause FDI to grow since the null hypothesis is accepted. FDI on the other hand, cause labour force to grow as the F-statistics is significant at 0.05 levels. Since, F-statistics is insignificant, it implies the wage rate of Banglaesh does not Granger cause FDI to grow while FDI causes wage rate in Bangladesh to grow because the null hypothesis is significant then. Thus, there are bidirectional causalities between FDI and GDP growth rate in Bangladesh that is, they cause each other to grow at the same tandem in the short run; otherwise, unidirectional causality exists between the pair-wise residual variables of the foreign direct investment function in Bangladesh.

### 8.9 Result of Impulse Response Analysis of the Variables in the VAR Model

The response of FDI to other variables is correlated and strongly convergent. The results of impulse response analysis are given by the following figure:

**Figure 8.9.1: Result of Impulse Responses of FDI to Other Variables in the VAR Model**




*For researcher's convenience only 10 subsequent periods have been considered.
Note: VAR estimation has become the near to the singular matrix after the first differenced data. Therefore, Impulse Response is drawn with the level form data.

Figure 8.9.1 presents the impulse response in the foreign direct investment to the GDP *(lngdp)*, GDP growth rate *(lngrgdp)*, the gross capital formation *(lngcf)*, the trade openness *(lnto)*, the stock of labour *(lnl)*, and the wage rate *(lnwr)* in the Bangladesh context for the post-independent era. It shows how a one-time positive shock of one standard deviation (± 2 S. E. innovations) to the GDP, growth rate of GDP, gross capital formation, trade openness, stock of labour and the wage rate endures on the foreign direct investment of Bangladesh. Figure 8.9.1.b presents the response of FDI to growth rate of GDP which reveals that it was only favourable in the third, fifth and eighth periods but negative in all other periods. Thus, this has a bad implication on the performances of Bangladesh economy. Likewise, gross capital formation had negative effect on FDI in the first, fifth and eighth period but decreases henceforth. Indeed, trade openness has a bad effect in the third, fifth and seventh periods but it has overall steady positive effect on foreign direct investment. Stock of labour and wage rate have slow positive and steady effects on FDI but they are converging with foreign direct investment in Bangladesh over the period.Therefore, the response of all independent variables is either positive or negative in the short run but in the long run they are responded towards the foreign direct investment in Bangladesh. Diversification of responses of GDP, gross capital formation as well as trade openness is very high in the short run yet they have responded towards the same path in the long run. Overall, the impulse response function traces positive influence of the response variables to the foreign direct investment of Bangladesh.

## 8.10 Result of Variance Decompositions of the Variables of FDI Function

**Table 8.10.1: Variance Decomposition Results of the FDI Function with VAR Model**

| Variance Decomposition of LNFDI: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Period | S.E. | LNFDI | LNGDP | LNGRGDP | LNGCF | LNTO | LNL | LNWR |
| 1 | 3.88 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 3.98 | 99.01 | 0.49 | 0.001 | 0.08 | 0.31 | 0.05 | 0.06 |
| 3 | 4.34 | 91.85 | 2.78 | 4.80 | 0.12 | 0.30 | 0.059 | 0.08 |
| 4 | 4.44 | 88.80 | 3.85 | 6.11 | 0.49 | 0.56 | 0.08 | 0.10 |
| 5 | 4.51 | 86.53 | 3.76 | 6.52 | 0.66 | 0.71 | 1.49 | 0.35 |
| 6 | 4.55 | 85.48 | 3.80 | 6.86 | 0.65 | 0.97 | 1.46 | 0.78 |
| 7 | 4.59 | 84.49 | 4.05 | 7.52 | 0.65 | 1.01 | 1.44 | 0.84 |
| 8 | 4.62 | 83.68 | 4.07 | 8.20 | 0.68 | 0.99 | 1.43 | 0.94 |
| 9 | 4.63 | 83.28 | 4.10 | 8.48 | 0.68 | 1.00 | 1.44 | 1.01 |
| 10 | 4.65 | 82.85 | 4.24 | 8.65 | 0.69 | 1.06 | 1.47 | 1.05 |
| Cholesky Ordering: lnfdi lngdp lngrgdp lngcf lnto lnl lnwr | | | | | | | | |

Estimation is performed with Eviews 5.1.
Note: VAR estimation has become to the near the singular matrix with the first differenced data. Therefore, Variance Decompositions of FDI functions have been drawn with the level form data.

Table 8.10.1 presents the variance decomposition outputs of FDI function for Bangladesh. It was documented that the variance of foreign direct investment is always caused by 100 percent by itself in the first year. In the second year, the foreign direct investment variance is decomposed into its own variance ( 99.01%) followed by GDP (0.46%), GDP growth rate (0.01%), gross capital formation (0.08%), trade openness (0.31%), stock of labour (0.06%) and wage rate (0.06%). However, in subsequent years, the share of GDP increases to approximately 4.24% followed by the volume GDP growth rate, gross capital formation, trade openness, stock of labour and wage rate are increased to (8.65%, 0.69%, 1.06%, 1.47%, and 1.05% respectively). On the other hand, the share of FDI in explaining the variance decomposition decreases gradually from the second year up to the tenth year. Summarily, the changes in FDI are mainly caused by its own variation which by the end of the tenth year, it could be accounted for 20% less (i.e. 80%). The volatility of foreign direct investment is mainly caused by its own variation, as it always accounts for major portion (above 80%) of the fluctuations.

## 8.11 Model Diagnostics of the FDI Function

### 8.11.1 Results of L-M and the B-G Tests

**Table 8.11.1.1: Results of Autocorrelation and Normality Tests of the FDI Function**

| Tests | L-M Test Statistics | Probability | Conclusions |
|---|---|---|---|
| F-statistic | 5.975539 | 0.020014 | No Autocorrelation |
| Obs*R-squared | 6.285919 | 0.012170 | Normally Distributed |

The Tests are performed with Eviews 5.1.

Table 8.11.1.1 indicates the results of the autocorrelation of the estimated FDI function. In case of equation (8.5.1), both the probability values are greater than 0.01. The F-statistic of the L-M test is 5.98 and the probability is 0.02 which is also greater than $\alpha = 0.01$. That is, the null hypothesis of autocorrelation is rejected. Likewise, the table further shows that Breusch–Godfrey serial correlation test reveals no autocorrelation among the variables (Obs*R-squared 6.29 with associated P-value 0.012). These imply that the estimated foreign direct investment equation does not suffer from autocorrelation problem as well as the residuals follow the normality of the distribution.

### 8.11.2 Result of the White Grneral Heteroscedasticity Test

**Table 8.11.2.1: Results of the White Heteroskedasticity Test**

| Tests | WH Test Statistics | Probability | Conclusion |
|---|---|---|---|
| F-statistic | 8.002619 | 0.000062 | No Heteroscedasticity |
| Obs*R-squared | 39.17575 | 0.046902 | Normally Distributed |

The Test is performed with Eviews 5.1.

Table 8.11.2.1 shows that the F-statistic of the White Heteroscedasticy test is 8.003 with respective probability 0.0001, which is smaller than the critical value ($\alpha$) 0.05. This implies that the null hypothesis of no heteroscedasticity is accepted. That is, the equation (8.5.1) is free from heteroscedasticity problem. The Breusch–Pagan-Godfrey test also reveals homoscedasticity (Obs*R-square 39.18 with associated P-value 0.047) of the distribution.

### 8.11.3 Results of the Stability Test

It can be seen from the figures for equation (8.5.1) 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.

**Figure 8.11.3.1: Result of CUSUM Test**

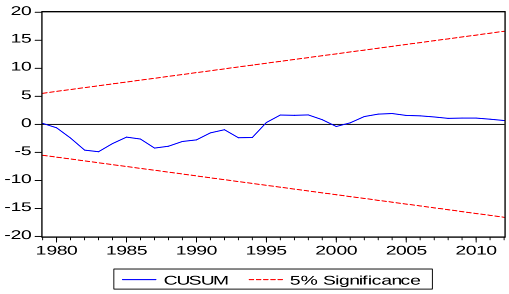
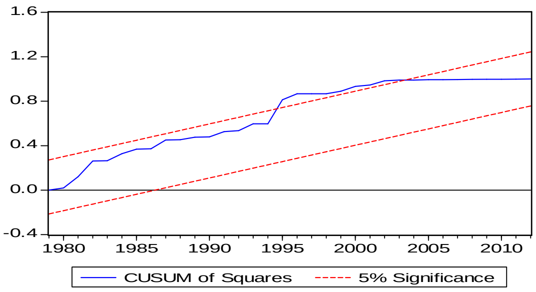



**Figure 8.11.3.2: Result of CUSUMSQ Test**




Figures are drawn with Eviews 5.1.

Figure 8.11.3.1 states the result of CUSUM test that the test statistic stays within the 95 percent confidence interval. That is, there is no structural break of the model over the period. Figure 8.11.3.2 on the other hand, indicates that the statistics of CUSUMSQ test begins from inside of the confidence interval but after 1995, it crosses the confidence interval and remains outside of the 95 percent confidence interval. In 2005, it falls again inside the 95 percent interval. These imply that estimates and the variation of the estimates of the model have the short run structural breaks but are stable in the long run. Thus, a short run structural change is found in the model. Finally, it could be concluded that both the models are structurally stable and specified in the long run. So, these parameters could be used for policy purposes study safely.

## 8.12 Conclusion

The objective of this chapter is to assess the influences of different components of foreign direct investment as well as to examine the causal relationships associated with them at the disaggregated level. In this case, a complete econometric procedure has been carried throughout this chapter. No structural break point in 1990 is found in the Chow test while there is high instability index (CII) in the pre liberalization than the post liberalization periods. The time series properties of the data have been tested first by applying the correlogram, ADF, D-F (GLS), and Phillips-Perron tests. Results find that the data are suffering with unit root problem at the level but it has been vanished after the first difference and the data then have been stationary. Since, the data of the variables are integrated of order one, there exists 2 (two) cointegrating long run relationships between FDI and its different components as the trace and max-eigen value statistics of Johansen method are significant for every case. The OLS estimated coefficients of the FDI function indicate that FDI inflows in Bangladesh are influenced by its different factors but gross capital formation significantly negatively affects FDI in Bangladesh while GDP growth rate and wage rate in Bangladesh positively affect FDI. It is thus, negatively influenced by the GDP, stock of labour and trade openness but they are insignificant. The VECM results show that the long run relationships exist between GDP growth rate, and stock of labour to FDI in Bangladesh. The short run relationships exist between GDP and gross capital formation to FDI. The VAR estimation indicates that the long run significant elasticity exists between gross capital formation and the foreign direct investment in Bangladesh. The short run elasticities of the GDP, gross capital formation, stock of labour and wage rate in Bangladesh to FDI is significant either they may be positive or negative. The Augmented Garanger Causality test indicates that there are bidirectional causalities between FDI and GDP growth rate. Otherwise, there is unidirectional causality between the pair-wise variables of the FDI function in Bangladesh in the short run. The Impulse Response Analysis (IRA) confirms that 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 foreign direct investment in Bangladesh. The variance decomposition outputs are documented that the variance of foreign direct investment is always caused by 100 per cent by itself in the first year. The share of FDI in explaining the variance decomposition decreases gradually from the second year up to the tenth year. The volatility of FDI is very high and it accounts majorly above 80 percent. Finally, for the robustness of the results, model diagnostic tests have been applied accordingly.

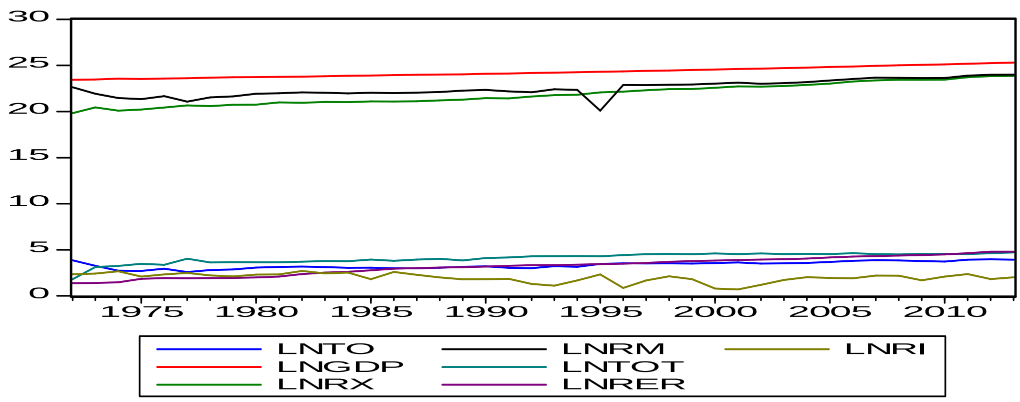
## Chapter Nine: Empirical Results of Trade Openness Function

### 9. Introduction

One of the objectives of this study is to assess the influences of the factors of trade openness in Bangladesh as well as to examine the causal relationships associated with them at the disaggregated level. In this context, a complete econometric procedure has been carried out throughout this chapter, so that the objectives are to be met up and the hypotheses are to be tested accordingly. This chapter thus, tries to estimate the trade openness function by ordinary least squares (OLS) method. The empirical results include the pre-estimation techniques like the Chow break point test, the Coppock instability index, the statistical description of the trade openness function, the correlation matrix, the normality of the time series data. The stationarity of the data has been examined with the popular unit root tests; the long run cointegrated relationships have also been justified by Johansen Maximum Likelihood method so that the function could be estimated to assess the influences of different factors on trade openness in Bangladesh. The short and long run elasticities, the causal relationships associated with these variables, the impulse response and the variance decomposition of trade openness function have also been examined throughout this chapter. Besides, various post estimation model diagnostic tests (L-M test, B-G test, WGH test, the CUSUM and CUUSUMSQ tests) have been carried out. The popular econometric software Eviews 5.1 has been performed basically for analyzing the econometric results.

### 9.1 Trend and Nature of the Variables in the Trade Openness Function

**Figure 9.1.1: Trend and Nature of the Variables in the Trade Openness Function**




Source: Figure is drawn on the basis of Table 9.1.1 (in Appendix)

Figure 9.1.1 shows that each of the variables has the upward trend over the period but the slopes of them are different. The trend of trade openness is steady upward and increasing pattern but the trend is very slow with some fluctuations. GDP line shows that there is a fresh upward rising trend over the period in Bangladesh. The real export of Bangladesh is also steady increasing trend with very slow upward slope but the growth rate of real import is very much upward rising up to 1995 and then remains a stable rising pattern with little fluctuations. The corresponding terms of trade is obviously upward rising over the year in Bangladesh. The real exchange rate is freshly increased continuously over the years while the real inflation rate in Bangladesh is very much unstable. Up to 1987, inflation rate in Bangladesh was very high and then it falls drastically with a wide fluctuations and the inflation rate reached at its lowest stage in 2001. The inflation in Bangladesh is again going to increase from 2002 to the date. That is, the slope of real inflation in Bangladesh has a mixed trend. The degree of trade openness in Bangladesh is however not satisfactory and it remains almost same over the periods. On an average, the nature and trend of variables of trade openness function in Bangladesh are positive and upward trends over the periods. Thus, in the short run they are fluctuated but they all have steady upward trends in the long run.

## 9.2 Structural Changes of Trade Openness in Bangladesh

### 9.2.1 Result of the Chow Test

The Chow test is conducted to measure the structural changes in the degree of trade openness in Bangladesh. The results of the Chow test are shown below:

**Table 9.2.1.1: Results of the Chow Structural Breakpoint Test**

| Chow Breakpoint Test: 1990 | | | |
|---|---|---|---|
| F-statistic | 10.10355 | Prob: (2, 42) | 0.000003 |
| Log likelihood ratio | 52.92554 | Prob: Chi-square (2) | 0.000000 |

Source: Estimated from the Table: 9.1.1 (in Appendix) and the test are performed with Eviews 5.1.

Table 9.2.1.1 shows that the test results confirm that there exists no structural breakpoint in 1990 in the series of trade openness during the study period. Since, the calculated F-statistic is 10.13, which is greater than the F-critical value and it is also confirmed by the p-value equals to 0.0003 which is much lower than any significance levels (α). Since, the p-value is very small the null hypothesis has become statistically significant and there is no structural breakpoint of trade openness in Bangladesh in 1990. Though, this year is the turning point of trade liberalization in Bangladesh and the country was moving to the free market economy with globalization after establishment of World

Trade Organization (WTO). But the contribution of Bangladeshi trade to the world market is very much negligible and the export import ratio is always negative. The degree of trade openness is therefore, very low here. Hence, there is no structural breaking point of trade openness in 1990 in Bangladesh.

### 9.2.2 Result of Coppock Instability Index

The instability of trade openness in Bangladesh is measured by using Coppock Instability Index. That is, the higher value of the Coppock Instability Index indicates the higher degree of instability of the function.

**Table 9.2.2.1: Coppock Instability Index of Trade Openness in Bangladesh**

| Period | Coppock Instability Index (CII) in % |
|---|---|
| Pre-Liberalization | 17.0 |
| Post-Liberalization | 13.5 |
| Overall | 15.1 |

Note: CII= [Antilog $\sqrt{Variance}-1$ ]*100

Source: Estimated from the data of Table 9.1.1 (in Appendix). The test is performed with Eveiws 5.1.

Table 9.2.2.1 observes that the CII is 17.0 percent during the pre-liberalization and 13.5 percent during the Post-liberalization regimes. Therefore, it is clear that the instability in trade openness is higher during Pre-liberalization (17.0) than Post-liberalization (13.5) periods. The CII of Pre liberalization period is also higher than that of during the overall study period (15.1 percent). This result is strongly supported by Moniruzzaman, 2011.

### 9.2.3 Descriptive Statistics of the Trade Openness Function

**Table 9.2.3.1: Results of the Descriptive Statistics of the Trade Openness Function**

| | LNTO | LNGDP | LNRX | LNRM | LNTOT | LNRER | LNRI |
|---|---|---|---|---|---|---|---|
| Mean | 3.34 | 24.26 | 21.86 | 22.51 | 4.10 | 3.21 | 1.97 |
| Median | 3.24 | 24.19 | 21.70 | 22.35 | 4.29 | 3.34 | 2.06 |
| Maximum | 3.97 | 25.30 | 23.85 | 24.00 | 4.71 | 4.80 | 2.70 |
| Minimum | 2.59 | 23.44 | 19.83 | 20.09 | 1.80 | 1.37 | 0.70 |
| Std. Dev. | 0.38 | 0.55 | 1.16 | 0.87 | 0.57 | 1.00 | 0.50 |
| Skewness | 0.01 | 0.29 | 0.17 | -0.22 | -1.70 | -0.26 | -0.95 |
| Kurtosis | 1.91 | 1.90 | 1.82 | 2.87 | 7.20 | 1.97 | 3.43 |
| Jarque-Bera | 2.08 | 2.69 | 2.64 | 0.36 | 50.97 | 2.34 | 6.69 |
| Probability | 0.35 | 0.26 | 0.27 | 0.84 | 0.00 | 0.31 | 0.04 |
| Sum | 140.10 | 1019.11 | 918.01 | 945.43 | 171.97 | 134.82 | 82.72 |
| Sum Sq. Dev. | 5.94 | 12.44 | 54.82 | 31.24 | 13.34 | 41.05 | 10.05 |
| Observations | 42 | 42 | 42 | 42 | 42 | 42 | 42 |

The Test is peroformed with Eviews 5.1.*Data have been rounded within 4 digits after decimal.
Source: Table 9.1.1 (in Appendix).

Table 9.2.3.1 explains a simple statistical description of the study. It shows that the 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 terms of trade, real exchange rate and real inflation. The numeric of skewness of each variable is low and is mildly negatively skewed but for trade openness, GDP and real export is positively skewed. The figures for kurtosis of GDP, trade openness, real export, real import and real exchange rate variables are below 3 which confirms near normality. The Jarque-Bera test statistics also cannot reject the null hypothesis of normal distribution of the variables, except two *(lntot and lnri),* with varying probabilities. It is mentionable that data of some variables are seen non-normal in the level form with high probability of the Jerque-Bera test but they are completely normal at the first difference. The Sum and Sum Sq. Dev. ensures that there is no structural break of the data. Thus, the normality of the distribution is ensured in the study.

### 9.2.4 Correlation among the Variables of Trade Openness Function

**Table 9.2.4.1: Correlation among the Variables of Trade Openness Function**

| | LNTO | LNGDP | LNRX | LNRM | LNTOT | LNRER | LNRI |
|---|---|---|---|---|---|---|---|
| LNTO | 1 | 0.8333 | 0.8327 | 0.8428 | 0.4697 | 0.7720 | -0.2805 |
| LNGDP | 0.8333 | 1 | 0.9941 | 0.8468 | 0.8290 | 0.9758 | -0.3659 |
| LNRX | 0.8327 | 0.9941 | 1 | 0.8321 | 0.8561 | 0.9724 | -0.3840 |
| LNRM | 0.8428 | 0.8467 | 0.8321 | 1 | 0.5616 | 0.7937 | -0.3498 |
| LNTOT | 0.4697 | 0.8290 | 0.8561 | 0.5616 | 1 | 0.8807 | -0.4976 |
| LNRER | 0.7720 | 0.9758 | 0.9724 | 0.7937 | 0.8807 | 1 | -0.4394 |
| LNRI | -0.2805 | -0.36589 | -0.3840 | -0.3499 | -0.4976 | -0.4394 | 1 |

The Test is peroformed with Eviews 5.1.*Data have been rounded within 4 digits after decimal.
Source: Table 9.1.1 in Appendix.

Table 9.2.4.1 shows the correlation among the variables of trade openness function in Bangladesh. The correlation between trade openness and GDP is 0.8333 while the correlations between trade openness and real exports, real imports, terms of trade, real exchange rate and real inflation are 0.8327, 0.8428, 0.4697, 0.7720 and -0.2805 respectively. The dependent variable *lnto* is positively related with all of the independent variables of the function as expected but real inflation rate is negatively correlated with trade openness of the country. It is also consistent with the theory of trade openness that it is the positive functions of GDP, real export, real import, terms of trade, and real exchange rate but negatively related with the real inflation rate of the country. That is, trade openness in Bangladesh is seriously affected by the domestic inflation rate.

## 9.3 Result of Unit Root Tests of the Trade Openness Function

The time series econometric analysis requires that the variables (*lnto, lngdp, lnrx, lnrm, lntot, lnrer, and lnri*) would be non-stationary otherwise, it could provide spurious results.

That is, they all have unit root problem and hence they suffer from instability problem in the short run. The results of the unit root tests are as follows:

### 9.3.1 Result of the Correlogram Test

If the correlogram statistics are less than the variances of the term, the hypothesis of the stationarity of the data is accepted otherwise, rejected. The results of the correlogram test with level and first difference form are given below:

**Table 9.3.1.1: Results of Correlogram Test of Trade Openness at the Level Form**

| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| . \|****** \| | . \|****** \| | 1 | 0.781 | 0.781 | 27.504 | 0.000 |
| . \|***** \| | . \| . \| | 2 | 0.600 | -0.026 | 44.148 | 0.000 |
| . \|**** \| | . \| . \| | 3 | 0.481 | 0.051 | 55.102 | 0.000 |
| . \|*** \| | . \| . \| | 4 | 0.374 | -0.030 | 61.914 | 0.000 |
| . \|** \| | .*\| . \| | 5 | 0.267 | -0.058 | 65.480 | 0.000 |
| . \|** \| | . \|*. \| | 6 | 0.228 | 0.101 | 68.159 | 0.000 |
| . \|*. \| | . \| . \| | 7 | 0.176 | -0.056 | 69.797 | 0.000 |
| . \|*. \| | . \|*. \| | 8 | 0.158 | 0.074 | 71.149 | 0.000 |
| . \|*. \| | . \| . \| | 9 | 0.129 | -0.040 | 72.080 | 0.000 |
| . \|*. \| | . \| . \| | 10 | 0.114 | 0.026 | 72.836 | 0.000 |
| . \|*. \| | . \| . \| | 11 | 0.100 | 0.007 | 73.431 | 0.000 |
| . \|*. \| | . \| . \| | 12 | 0.084 | -0.019 | 73.869 | 0.000 |
| . \|*. \| | . \| . \| | 13 | 0.084 | 0.056 | 74.319 | 0.000 |
| . \|*. \| | . \| . \| | 14 | 0.079 | -0.026 | 74.729 | 0.000 |

The test is conducted with Eviews 5.1.

Table 9.3.1.1 shows the sample correlogram of trade openness in Bangladesh at the level. It shows the correlogram up to 14 lags. The striking feature of this sample correlogram is that it starts at high value (about 0.781 at lag 1) and then tapers off gradually. At lag 4 the autocorrelation coefficient is 0.374. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n*, where *n* is sample size. Since, the number of observation is *42*, implying a variance of *1/42* or about (*0.0238*) and the standard error is $\sqrt{0.0238}$= *0.1543*. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1543)\,]$ = ± 0.303. The estimated coefficients up to lag *4* fall outside of the interval. This implies that the null hypothesis cannot be rejected and the data series is non-stationary.

The test provides the same results for the rest of the variables of the trade openness function like GDP, real export, real import, terms of trade, real exchange rate and real inflation rate in Bangladesh. Hence, data of the variables are non-stationary at the level which indicates that they are suffering with unit root problem at their level. So, it is better to test them in the first difference.

**Table 9.3.1.2: Results of Correlogram Test of Trade Openness at the First Difference**

| Autocorrelation | Partial Correlation | Lag | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| . \|*. \| | . \|*. \| | 1 | 0.171 | 0.171 | 1.2878 | 0.256 |
| . \| . \| | .*\| . \| | 2 | -0.033 | -0.064 | 1.3367 | 0.513 |
| . \| . \| | . \| . \| | 3 | -0.009 | 0.008 | 1.3404 | 0.720 |
| . \| . \| | . \| . \| | 4 | 0.033 | 0.033 | 1.3934 | 0.845 |
| .*\| . \| | .*\| . \| | 5 | -0.109 | -0.125 | 1.9754 | 0.853 |
| .*\| . \| | . \| . \| | 6 | -0.098 | -0.055 | 2.4619 | 0.873 |
| .*\| . \| | .*\| . \| | 7 | -0.120 | -0.108 | 3.2114 | 0.865 |
| . \| . \| | . \| . \| | 8 | -0.017 | 0.012 | 3.2266 | 0.919 |
| . \| . \| | . \| . \| | 9 | 0.001 | -0.002 | 3.2266 | 0.955 |
| . \| . \| | . \| . \| | 10 | 0.051 | 0.046 | 3.3759 | 0.971 |
| . \| . \| | . \| . \| | 11 | 0.021 | -0.002 | 3.4014 | 0.984 |
| . \| . \| | . \| . \| | 12 | 0.001 | -0.028 | 3.4016 | 0.992 |
| . \| . \| | . \| . \| | 13 | 0.047 | 0.040 | 3.5413 | 0.995 |
| . \| . \| | . \| . \| | 14 | 0.037 | 0.004 | 3.6319 | 0.997 |

The test is conducted with Eviews 5.1.

Table 9.3.1.2 presents the sample correlogram of trade openness *(Δlnto)* in the first difference. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n*, where *n* is the sample size. Since, the number of observation is *41* after first difference, implying a variance *of1/41* or about (*0.0244*) and the standard error is $\sqrt{0.0244}$= *0.1562*. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is [ $0 \pm 1.96(0.1562)$ ]= ± *0.306*. All the estimated coefficients of ACF fall inside of the interval. Therefore, the null hypothesis can be rejected at 5% significance level because all the lag values fall inside the confidence interval. This implies that the series is stationary after the first difference because the unit root problem has been vanished then. Similar results have been found for the rest of the variables of the trade openness function that is, they all have been freed from unit root problem and the data have been found stationary after the first difference. Therefore, the correlogram results show that the time series data is non-stationary at the level form but they have been found stationary after the first difference. That is, they all are integrated of order one *I(1)*.

### 9.3.2 Result of the Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey- Fuller test is popularly 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. The results are shown by the Table 9.3.2.1.

Table 9.3.2.1 presents the level values as non-stationary of the data because 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 has been vanished after the first difference of the data because the ADF statistics are greater than their critical values at both 1% and 5% level of significance and the null hypothesis of non-stationarity has been rejected and the data have been stationary after first difference. It can be said that the first difference of trade openness and it various component series do not have unit root problem. The table further shows the adjustment coefficient $R^2$ (the goodness of fit) provides a high rate of fit for the data series after the first difference, whereas, they were insignificant in the level form. The Durbin Watson *d* statistics show that each of data series contains a high level autocorrelation in the level form but the problems have been reduced significantly from the data after the first difference.

**Table 9.3.2.1: Results of the Augmented Dickey-Fuller (ADF) Unit Root Test**

| Variables | Lag | With An Intercept but Not A Trend | | | | | With An Intercept and A Linear Trend | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ADF Statistic | Crit. Value (1%) | Crit. Value (5%) | $R^2$ Value | *d* Value | ADF Statistic | Crit. Value (1%) | Crit. Value (5%) | $R^2$ Value | *d* Value |
| lnto | 1 | -1.1188 | -3.6056 | -2.9369 | 0.0716 | 2.3545 | -7.3960 | -4.1985 | -3.5236 | 0.6216 | 1.9680 |
| lngdp | 5 | 2.5686 | -3.6268 | -2.9458 | 0.5772 | 1.9344 | 0.2331 | -4.2350 | -3.5403 | 0.5799 | 1.9813 |
| lnrx | 1 | 1.1423 | -3.6056 | -2.9370 | 0.2666 | 1.5906 | -2.2436 | -4.2050 | -3.5266 | 0.3680 | 1.5286 |
| lnrm | 1 | -0.9280 | -3.6056 | -2.9370 | 0.2046 | 2.2147 | -5.7369 | -4.1985 | -3.5236 | 0.4713 | 2.1595 |
| lntot | 1 | -2.7637 | -3.6056 | -2.9370 | 0.2196 | 2.3864 | -3.9752 | -4.2050 | -3.5266 | 0.3801 | 2.0587 |
| lnrer | 1 | -1.2447 | -3.6010 | -2.9350 | 0.0382 | 1.5669 | -2.7996 | -4.2050 | -3.5266 | 0.2421 | 1.8931 |
| lnri | 1 | -3.4163 | -3.6010 | -2.9350 | 0.2303 | 2.0413 | -3.7097 | -4.1985 | -3.5236 | 0.2670 | 1.9621 |
| Δlnto | 1 | -6.1999 | -3.6056 | -2.9369 | 0.5029 | 2.3692 | -6.0794 | -4.2050 | -3.52661 | 0.5010 | 2.3287 |
| Δlngdp | 1 | -3.3955 | -3.6105 | -2.9390 | 0.6471 | 1.0384 | -9.9653 | -4.2050 | -3.5266 | 0.7286 | 1.7918 |
| Δlnrx | 1 | -12.2463 | -3.6056 | -2.9370 | 0.7978 | 1.5207 | -12.4228 | -4.2050 | -3.5266 | 0.8082 | 1.6003 |
| Δlnrm | 1 | -7.3487 | -3.6105 | -2.9390 | 0.7635 | 2.1675 | -7.3398 | -4.2119 | -3.5298 | 0.7679 | 2.1765 |
| Δlntot | 1 | -12.1390 | -3.6056 | -2.9369 | 0.7950 | 2.5694 | -12.1524 | -4.2050 | -3.5266 | 0.8058 | 2.5513 |
| Δlnrer | 1 | -5.0914 | -3.6105 | -2.9390 | 0.4391 | 1.4613 | -5.3688 | -4.2119 | -3.5298 | 0.4724 | 1.4912 |
| Δlnri | 1 | -7.4013 | -3.6105 | -2.9390 | 0.6926 | 2.1846 | -7.4045 | -4.2117 | -3.5298 | 0.6981 | 2.2175 |

The test is conducted with Eviews 5.1;
Note: 95% critical value for the Augmented Dickey – Fuller statistic=-2.9665
* Critical values (5%) are from Mackinnon (1991).

Where, *lnto* = trade openness; *lngdp* = output of the country used as the proxy of economic growth; *lnrx* = real export; *lnrm* = real import; *lntot* = terms of trade (export import ratio); *lnrer* = real exchange rate; and *lnri = real inflation rate.Δ*= First Difference, Critical values (5%) are from Mackinnon (1991).

Thus, the time series data of GDP 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 becomes stationary for the integration of order one *I(1)*.

### 9.3.3 Result of the D-F (GLS) Test

Table 9.3.3.1 indicates that the time series data of trade openness function have been non-stationary at the level form because the D-F (GLS) statistics are less than their critical value at both 0.01 and 0.05 level of significance. Therefore, the null hypothesizes of unit root problems have been accepted. But, the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data becomes stationary for the integration of order one *I(1)* .

**Table 9.3.3.1: The Results of D-F (GLS) Unit Root Test**

| Variables | Lag | With An Intercept But Not A Trend | | | With An Intercept And A Linear Trend | | |
|---|---|---|---|---|---|---|---|
| | | GLS Statistic | Critical Value (1%) | Critical Value (5%) | GLS Statistic | Critical Value (1%) | Critical Value (5%) |
| lnto | 1 | -1.3221 | -2.624 | -1.9493 | -1.9974 | -3.7700 | -3.1900 |
| lngdp | 1 | 1.2792 | -2.6241 | -1.9493 | -0.4768 | -3.7700 | -3.1900 |
| lnrx | 1 | 1.4754 | -2.6226 | -1.9491 | -2.5982 | -3.7700 | -3.1900 |
| lnrm | 1 | -1.0997 | -2.6241 | -1.9493 | -4.3380 | -3.7700 | -3.1900 |
| lntot | | -0.7839 | -2.6226 | -1.9491 | -2.7716 | -3.7700 | -3.1900 |
| lnrer | | 0.2574 | -2.6241 | -1.9493 | -2.3992 | -3.7700 | -3.1900 |
| lnri | 3 | -1.3039 | -2.6272 | -1.9499 | -3.8139 | -3.7700 | -3.1900 |
| Δlnto | 1 | -1.6805 | -2.6256 | -1.9496 | -4.2600 | -3.7700 | -3.1900 |
| Δlngdp | 1 | -3.3126 | -2.6256 | -1.9496 | -10.2087 | -3.7700 | -3.1900 |
| Δlnrx | 0 | -3.3007 | -2.6256 | -1.9496 | -5.6272 | -3.7700 | -3.1900 |
| Δlnrm | 1 | -7.3458 | -2.6256 | -1.9496 | -9.3906 | -3.7700 | -3.1900 |
| Δlntot | 0 | -2.1460 | -2.6256 | -1.9496 | -4.2790 | -3.7700 | -3.1900 |
| Δlnrer | 1 | -4.3717 | -2.6256 | -1.9496 | -5.0850 | -3.7700 | -3.1900 |
| Δlnri | 1 | -7.2291 | -2.6256 | -1.9496 | -7.4926 | -3.7700 | -3.1900 |

The test is conducted with Eviews 5.1.
Note: 95% critical value for the Augmented Dickey – Fuller statistic=-2.9665
* Critical values (5%) are from Mackinnon (1991).

### 9.3.4 Result of the Phillips-Perron Test

**Table 9.3.4.1: Result of the Phillips-Perron Unit Root Test**

| Variables | With An Intercept But Not A Trend | | | With An Intercept And A Linear Trend | | |
|---|---|---|---|---|---|---|
| | PP Statistic | Critical Value (1%) | Critical Value (5%) | PP Statistic | Critical Value (1%) | Critical Value (5%) |
| lnto | -1.6509 | -3.6010 | -2.9350 | -7.3837 | -4.1985 | -3.5236 |
| lngdp | 12.8492 | -3.6010 | -2.9350 | 1.1627 | -4.1985 | -3.5236 |
| lnrx | -0.3390 | -3.6010 | -2.9350 | -3.4518 | -4.1985 | -3.5236 |
| lnrm | -1.6559 | -3.6010 | -2.9350 | -5.7520 | -4.1985 | -3.5236 |
| lntot | -5.1426 | -3.6010 | -2.9350 | -8.3907 | -4.1985 | -3.5236 |
| lnrer | -1.3697 | -3.6010 | -2.9350 | -2.0667 | -4.1985 | -3.5236 |
| lnri | -3.3910 | -3.6010 | -2.9350 | -3.7097 | -4.1985 | -3.5236 |
| Δlnto | -6.4890 | -3.6010 | -2.9350 | -6.27609 | -4.1985 | -3.5236 |
| Δlngdp | -7.3340 | -3.6010 | -2.9350 | -20.4405 | -4.1985 | -3.5236 |
| Δlnrx | -12.3465 | -3.6010 | -2.9350 | -14.7098 | -4.1985 | -3.5236 |
| Δlnrm | -14.6414 | -3.6010 | -2.9350 | -16.4703 | -4.1985 | -3.5236 |
| Δlntot | -13.7299 | -3.6010 | -2.9350 | -14.4481 | -4.1985 | -3.5236 |
| Δlner | -4.7721 | -3.6056 | -2.9370 | -4.8849 | -4.2050 | -3.5267 |
| Δlnri | -14.5643 | -3.6010 | -2.9350 | -17.5238 | -4.1985 | -3.5236 |

The test is performed with Eviews 5.1.

Table 9.3.4.1 shows the level values as non-stationary because the calculated values are less than their critical values in absolute term. The null hypothesis could not be rejected then. It indicates that the data suffer with the unit root problems. The non-stationarity problems have been vanished after the first difference of the data because the PP statistics are greater than their critical values at 1% and 5% level of significance and the null hypothesis of non-stationarity are rejected and the data are stationary after the first difference. Therefore, the null hypothesizes of unit root problems have been accepted 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 stationary for the integration of order one *I(1)*.

### 9.4 Results of Cointegration Test of Trade Openness Function

Since the variables *lnto, lngdp, lnrx, lnrm, lntot, lnrer, lnri* (trade openness, gross domestic products, real exports, real imports, country's terms of trade, real exchange rate and real inflation respectively ) are integrated of order 1 (one), it confirms the possibility of cointegration between them. The results of cointegration test are shown by the Table 9.4.1 to 9.4.6.

**Table 9.4.1: Cointegration Result between Trade Openness and GDP**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6551 | 53.4821 | 15.4947 | 0.0000 | 41.5168 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.2642 | 11.9653 | 3.8415 | 0.0005 | 11.9653 | 3.8415 | 0.0005 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 9.4.1 explains that the trace and max-eigen value statistics for trade openness ($\Delta$*lnto*) and GDP in Bangladesh ($\Delta$*lngdp*) are 53.48 and 41.52 for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 and 0.0005 probability) levels of significance in the first row. This implies that the null hypothesis of no cointegration is rejected. In the second row, both the trace and max-eigen value statistics are also greater than the critical values at 5 % (with 0.0000 and 0.0005 probability) significance level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Thus, there are 2 (two) cointegrating long run stable relations between trade openness and GDP in Bangladesh.

**Table 9.4.2: Cointegration Result between Trade Openness and Real Export**

| $H_0$ | $H_A$ | Eigen Value | Trace Stat. | 5% crit. Value | Probability** | Max-eigen Value | 5% crit. Val. | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6561 | 64.6111 | 15.4947 | 0.0000 | 41.6295 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.44527 | 22.9816 | 3.8415 | 0.0000 | 22.9816 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 9.4.2 shows that the trace and max-eigen value statistics for trade openness ($\Delta lnto$) and real export in Bangladesh ($\Delta lnrx$) are 64.61 and 41.63for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 and 0.0005 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. In the second row of the table, both the trace and max-eigen value statistics are greater than the critical values at 5 % (with 0.0000 and 0.0005 probability) significance level. Hence, the null hypothesis of no cointegration is rejected. Hence, there are 2 (two) cointegrating stable relations between trade openness and real export in Bangladesh.

**Table 9.4.3: Cointegration Result between Trade Openness and Real Import**

| $H_0$ | $H_A$ | Eigen Value | Trace Stat. | 5% crit. Value | Probability** | Max-eigen Value | 5% crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6248 | 71.4896 | 15.4947 | 0.0000 | 38.2297 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5738 | 33.2599 | 3.8415 | 0.0000 | 33.2599 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 9.4.3 finds that the trace and max-eigen value statistics for trade openness ($\Delta lnto$) and real imports of Bangladesh ($\Delta lnrm$) are 71.49 and 38.23 for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels. 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 greater than their critical values at 0.05 (with 0.0000 probability) significance level. Hence, the null hypothesis of no cointegration is rejected and there are 2 (two) cointegrating stable relations between trade openness and real imports in Bangladesh.

**Table 9.4.4: Cointegration Result between Trade Openness and Terms of Trade**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6580 | 65.4844 | 15.4947 | 0.0000 | 41.8437 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.4546 | 23.6407 | 3.8415 | 0.0000 | 23.6407 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 9.4.4 indicates that the trace and max-eigen value statistics for trade openness ($\Delta lnto$) and terms of trade ($\Delta lntot$) are 65.48 and 41.84for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% (with 0.0000 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected at 0.05 levels. In the second row, both the trace and max-eigen value tests are greater than their critical values. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Hence, there are 2 (two) cointegrating long run stable relations between trade openness and terms of trade of Bangladesh.

**Table 9.4.5: Cointegration between Trade Openness and Real Exchange Rate**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.7639 | 68.4596 | 15.4947 | 0.0000 | 56.2921 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.2680 | 12.1676 | 3.8415 | 0.0000 | 12.1676 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 9.4.5 finds that the trace and max-eigen value statistics for trade openness ($\Delta lnto$) and real exchange rate in Bangladesh ($\Delta lnrer$) are 68.46 and 56.29for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 0.05 (with 0.0000 and 0.0005 probability) levels in the first row. That implies the null hypothesis of no cointegration is rejected. In the second row, both the trace and max-eigen value statistics are greater than the critical values at 0.05 (with 0.0000 and 0.0005 probability) significance level. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. So, there are 2 (two) cointegrating long run stable relations between trade openness and real exchange rate in Bangladesh.

**Table 9.4.6: Cointegration Result between Trade Openness and Real Inflation**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6915 | 74.2875 | 15.4947 | 0.0000 | 45.8645 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5175 | 28.4230 | 3.8415 | 0.0000 | 28.4230 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 9.4.6 discusses that the trace and max-eigen value statistics for trade openness ($\Delta lnto$) and real inflation in Bangladesh ($\Delta lnri$) are 74.29 and 45.86 for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 and 0.0005 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. In the second row of the table, both the trace and max-eigen value statistics are greater than the critical values at 0.05 (with 0.0000 and 0.0005 probability) significant level. Hence, the null hypothesis of no cointegration is rejected and the alternative hypothesis of cointegration relation is accepted. Thus, there are 2 (two) cointegrating long run stable relations between trade openness and real inflation in

Bangladesh. The results of the cointegration test have also been supported by the following Figure 9.4.1.

**Figure 9.4.1: Cointegrated Relationships between Trade Openness and Its Components**

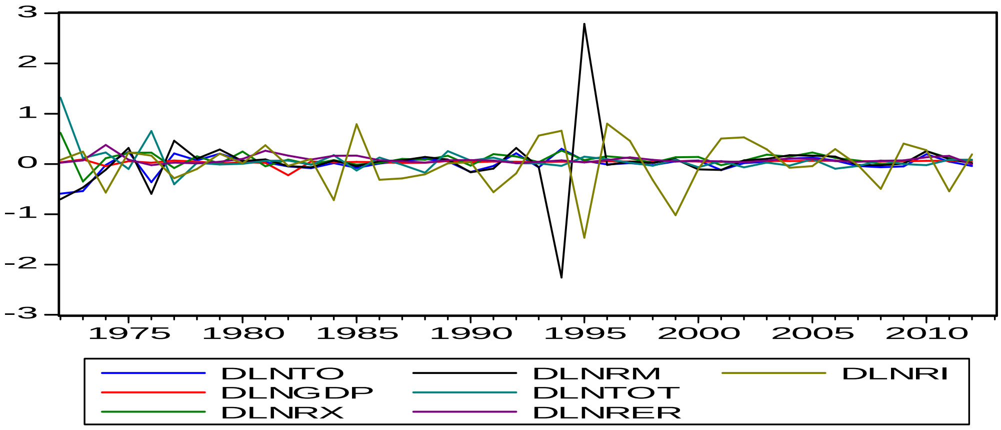



Figure is drawn with Eviews 5.1 using first differenced data.

Figure 9.4.1 presents that there are two cointegrated long run relationship between pair-wise trade openness and its various components in Bangladesh. High rates of fluctuations in the lines shown in the figure indicate that they are moving towards the right. The export line *(Δlnrx)* is more fluctuated than others but it is converging towards the trade openness line over the period in Bangladesh. This means that inflation in Bangladesh has also a downward and steady stream with little fluctuations over the period. The graph is thus drawn using the first differenced data of the respective variables. The figure finally indicates that though the lines are fluctuated in the short run but they all are converged each other in the long run.

The cointegration test results therefore, indicate that there are 2 (two) cointegrating long run relationships between the pair-wise variables of the trade openness function. So, there are stable long run relationships between trade openness and its various components in Bangladesh.

### 9.5 Estimation of Trade Openness Function by OLS

Since all variables are cointegrated each other, the function follows the properties of ordinary least squares (OLS) method. It is therefore, very much convenient to estimate the trade openness function (6.2.3.2) with the OLS method. In this case, the software Eviews-5.1 has been conducted.

The estimated trade openness regression model is:

$$\Delta \ln to = -0.050272 + 0.008748 \Delta \ln gdp + 0.842312 \Delta \ln rx^* + 0.015760 \Delta \ln rm - 0.744779 \Delta \ln tot^* + 0.217980 \Delta \ln rer - 0.049029 \Delta \ln ri .................................. (9.5.1)$$

(0.029779) (0.304998) (0.113588) (0.026713) (0.065181) (0.199195) (0.033698)

[-1.688178] [0.028681] [7.415483] [0.589996] [-11.42638] [1.094304] [-1.454950]

Source: Table 9.1.1 (in Appendix) and estimated with first differenced data.
Note: ** The coefficients are significant in both 5 and 1 percent level of significance.
The standard errors are shown in the brackets while the t-statistics are shown by the parenthesis.

The OLS estimated coefficients of the trade openness function indicate that they all are related with dependent variable. Some variables affect trade openness positively while others do not have so. Trade openness in Bangladesh is influenced by the factors of it but terms of trade and real inflation significant but negatively affect trade openness in Bangladesh. That is, an increase in terms of trade and real inflation, trade openness will be decreased by 7.7 and 5 percent respectively. Trade openness is again positively affected by GDP, real export, real import and real exchange rate in Bangladesh of which real export is significant. Trade openness in Bangladesh is also negatively influenced by the terms of trade and real inflation but the effect of terms of trade are more severe and significant. The result is partially supported by (Kok & Bernur, 2009).

### 9.5.1 Result of the Wald Test

**Table 9.5.1.1: Result of the Wald Test of Coefficients of Restrictions**

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| F-statistic | 22.37083 | (2, 34) | 0.0000 |
| Chi-square | 44.74167 | 2 | 0.0000 |
| Null Hypothesis Summary | | | |
| Normalized Restriction (= 0) | | Value | Std. Err. |
| C(1) | | -0.050272 | 0.029779 |
| C(3) - 2*C(4) | | 0.810792 | 0.121255 |

Note: Restrictions are linear in coefficients.

Table 9.5.1.1 indicates the Wald test of trade openness function which 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. That is, the critical values of both statistics are less than the calculated values that ensure the rejection of the null hypothesis of insignificant coefficients. Thus, the coefficients of trade openness function (9.5.1) are jointly significant in Bangladesh.

## 9.6 Result of the VECM of Trade Openness Function

The estimated coefficient of error correction term shows the long term effect and the estimated coefficient of lagged variables shows the short term effect. The cointegrating long run error correction results from VECM are shown by the following Table 9.6.1 to Table 9.6.6.

**Table 9.6.1: Result of VECM for Trade Openness and GDP (*Δlnto, Δlngdp*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnto_t$ | 1 | | |
| $\Delta lngdp_{1t}$ | -0.599183<br>(0.45221)<br>[-1.32500] | -0.745809*<br>(0.15704)<br>[-4.74922] | |
| Constant | -0.010277 | 0.001080<br>(0.00882)<br>[ 0.12237] | -0.119612<br>(0.11328)<br>[-1.05590] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 9.6.1 shows that the coefficient of variable ($\Delta lngdp_{1t}$) is -0.599183 which is negative but not significant at 5 percent level. This implies that an increase in GDP, trade openness will not be changed significantly in the long run. The short run coefficient of ($\Delta lngdp_{1t}$) is negative but statistically significant at 5 percent level. This implies that 1 percent increase in GDP, trade openness will be increased by 75 percent in the short run. Since, the coefficient of ECT is negative and t-statistic is insignificant (less than ±2), it can be said that there is no causation between trade openness and GDP. That is, there is scope of short run dynamics to the long run equilibrium between GDP and trade openness in Bangladesh.

**Table 9.6.2: Result of VECM for Trade Openness and Real Exports (*Δlnto, Δlnrx*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnto_t$ | 1 | | |
| $\Delta lnrx_{1t}$ | -2.073255*<br>(0.41035)<br>[-5.05243] | -0.254241<br>(0.29156)<br>[-0.87200] | |
| Constant | 0.174751 | -0.002026<br>(0.01616)<br>[-0.12541] | 0.502919*<br>(0.18745)<br>[ 2.68302] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 9.6.2 indicates that the coefficient of variable ($\Delta lnrx_{1t}$) is -2.07 which is negative and statistically significant at 5 percent level. Such magnitude implies that an increase in real exports, trade opnenness will be increased significantly in the long run. The short run coefficient of ($\Delta lnrx_{1t}$) is also negative but statistically insignificant at 5 percent level. This implies that 1 percent increase in real export; trade openness will not be increased significantly in the short run. Since, the coefficient of ECT is positive and t-statistic is statistically significant it can be said that causation goes from real export to trade openness.

That is, there exists a long run causality but with a divergence relations by 50 percent between real export and trade openness in Bangladesh.

**Table 9.6.3: Result of VECM for Trade Openness and Real Imports (*Δlnto, Δlnrm*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnto_t$ | 1 | | |
| $\Delta lnrm_{1t}$ | 0.951962*<br>(0.18375)<br>[ 5.18074] | 0.129292<br>(0.30703)<br>[ 0.42110] | |
| Constant | -0.090705 | -0.014427<br>(0.09596)<br>[-0.15034] | -1.620745*<br>(0.42175)<br>[-3.84286] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 9.6.3 finds that the coefficient of variable (*Δlnrm*$_{1t}$) is 0.95which is positive and but statistically significant at 5 percent level. Such magnitude implies that an increase in GDP, trade openness will be increased significantly in the long run. The short run coefficient of (*Δlnrm*$_{1t}$) is positive but statistically insignificant at 5 percent level. Again, the coefficient of ECT is negative but statistically significant, it can be said that causation goes from real imports to trade openness. That is, there is short run dynamic adjustment to the long run equilibrium by 1.6 percent between real import and trade openness in Bangladesh.

**Table 9.6.4: Result of VECM for Trade Openness and Terms of Trade (*Δlnto, Δlntot*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnto_t$ | 1 | | |
| $\Delta lntot_{1t}$ | 60.38981*<br>(10.8952)<br>[ 5.54278] | 0.066096<br>(0.20588)<br>[ 0.32104] | |
| Constant | -2.085916 | -0.010737<br>(0.01996)<br>[-0.53804] | -0.024780**<br>(0.00452)<br>[-5.47650] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 9.6.4 discusses that the coefficient of variable (*Δlntot*$_{1t}$) is 60.39, which is positive but statistically significant at 5 percent level. This implies that an increase in terms of trade, trade openness will be increased trade openness significantly in the long run. The short run coefficient of (*Δlntot*$_{1t}$) is positive but insignificant at 5 percent level. As the coefficient of ECT is negative but significant, it can be said that causation goes from terms of trade to trade openness. That is, there is short run dynamic adjustment to the long run equilibrium by 3 percent between terms of trade and trade openness in Bangladesh.

**Table 9.6.5: Result of VECM for Trade Openness and Real Exchange Rate** ($\Delta lnto$, $\Delta lnrer$)

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnto_t$ | 1 | | |
| $\Delta lnrer_{1t}$ | 0.052681<br>(0.24650)<br>[ 0.21371] | -0.237650*<br>(0.11833)<br>[-2.00841] | |
| Constant | -0.037259 | -0.002440<br>(0.00950)<br>[-0.25687] | 0.398157*<br>(0.12147)<br>[ 3.27784] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 9.6.5 finds that the coefficient of variable ($\Delta lnrer_{1t}$) is 0.05, which is positive but statistically insignificant at 5 percent level. This implies that an increase in real exchange rate, trade openness will not be changed significantly in the long run. The short run coefficient of ($\Delta lnrer_{1t}$) is negative but statistically significant at 5 percent level. This implies that 1 percent increase in real exchange rate; trade openness will be increased by 24 percent in the short run. The coefficient of ECT is negative but statistically significant. Thus, the causation goes from real exchange rate to trade openness in Bangladesh. That is, there is short run dynamic adjustment to the long run divergence between real exchange rate and trade openness in Bangladesh.

**Table 9.6.6: Result of VECM for Trade Openness and Real Inflation (**$\Delta lnto$**,** $\Delta lnri$**)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lnto_t$ | 1 | | |
| $\Delta lnri_{1t}$ | -0.413335*<br>(0.09199)<br>[-4.49338] | 0.007468<br>(0.25495)<br>[ 0.02929] | |
| Constant | -0.039195 | 0.036862<br>(0.08795)<br>[ 0.41911] | 2.559583*<br>(0.83463)<br>[ 3.06671] |

The test is performed with Eviews 5.1.
Note: Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 9.6.6 shows that the coefficient of variable ($\Delta lnri_{1t}$) is -0.41, which is negative but statistically significant at 5 percent level. This implies that an increase in real inflation, trade openness will be increased by 41 percent in the long run. The short run coefficient of ($\Delta lnri_{1t}$) is positive and statistically insignificant at 5 percent level. Since, the coefficient is positive and statistically significant, it can be said that causation goes from trade openness to real inflation. That is, there exists a long run causality but with a divergence relation by 2.56 percent between real inflation and trade openness in Bangladesh.

However, the long run relationships exist between trade openness and real export, real import, terms of trade, real inflation to the trade openness in Bangladesh. The short run relationships on the other hand, exist between trade openness, GDP, real exchange rate to the trade openness in Bangladesh. The VECM terms of the trade openness function in contrast, are significant for real export, real import, terms of trade, real exchange rate and real inflation to the trade openness in Bangladesh that means, there are scopes of short run equilibrium with long run dynamics between the pair-wise variables in the trade openness function but divergence between real export, real exchange rate and real inflation but divergence relation exists among real export, real exchange rate and real inflation to trade openness in Bangladesh.

### 9.7 Result of the VAR Model of Trade Openness Function

The coefficients of the cointegrating equation with log value are known as the long term elasticities while the first order lagged differenced values on the other hand, are known as the short term elasticities of the function. The long and short run elasticities of the function in the VAR model are given by the following table:

**Table 9.7.1: Short and Long Run Elasticities of the TO Function in the VAR Model**

| Elasticity | Constant | Δlngdp | Δlnrx | Δlnrm | Δlntot | Δlnrer | Δlnri |
|---|---|---|---|---|---|---|---|
| Long run | -0.050272<br>(0.029779)<br>[-1.688178] | 0.008748<br>(0.304998)<br>[0.028681] | 0.842312**<br>(0.113588)<br>[7.415483] | 0.015760<br>(0.026713)<br>[0.589996] | -0.744779**<br>(0.065181)<br>[-11.42638] | 0.217980<br>(0.199195)<br>[1.094304] | -0.049029<br>(0.033698)<br>[-1.454950] |
| Short run | 0.055707*<br>(0.02328)<br>[ 2.39293] | 0.007942<br>(0.21268)<br>[ 0.03734] | -0.421211<br>(0.30585)<br>[-1.37719] | -0.588713*<br>(0.22072)<br>[-2.66723] | -0.296630<br>(0.25962)<br>[-1.14253] | 0.389750*<br>(0.18454)<br>[ 2.11195] | 0.084656<br>(0.19312)<br>[ 0.43837] |

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

The first row of Table 9.7.1 indicates the long term elasticity of the trade openness *($\Delta lnto_t$)* function because it contains the coefficients of the log values of the estimated function. Table shows that the elasticity of the real export factor is positively significant at both 5 and 1 percent level of significance that means, an increase in real exports may increase trade openness by 84 percent in the long run. Again, the elasticities of terms of trade are negative but statistically significant at both 0.05 and 0.01 level. This implies that an increase in terms of trade, trade openness will be decreased by 74 percent in the long run. The coefficients of the differenced independent lag values shown in the second row of the table indicate that the coefficients of the constant term, real imports, and real exchange rate are statistically significant at both 5 percent level of significance in the short run. The coefficient of real imports is negative whereas, the coefficient of real exchange rate positively elastic to the trade openness in Bangladesh in the short run. That means, an increase in real import, will decrease trade openness by 59 percent while an increase in real exchange rate may increase trade openness in Bangladesh by 39 percent in the short run. Therefore, the long run significant elasticities exist between trade openness and real export (positive), as well as terms of trade (negative) in Bangladesh. The short run elasticities exist between trade openness and real imports (negative) as well as real exchange rate (positive) in Bangladesh.

### 9.8 Results of Granger Causality Test

Theory states that there should be at least one direction of causality between two variables if they are cointegrated of the same order. Ganger causality test is applied using different lags. Accordingly, the causality model has been tested by ***F*-**statistics and the results are presented by the Table 9.8.1 below.

**Table 9.8.1: Results of Pair-wise Granger Causality Test of TO and It's Components**

| Null Hypothesis | Obs. | Lag | F-Statistic | Probability | Decisions |
|---|---|---|---|---|---|
| *Δlngdp* does not Granger Cause *Δlnto* | 34 | 7 | 0.53532 | 0.79716 | Accepted |
| *Δlnto* does not Granger Cause *Δlngdp* | | | 2.47018 | 0.05543 | Rejected* |
| *Δlnrx* does not Granger Cause *Δlnto* | | 1 | 5.20033 | 0.02844 | Rejected* |
| *Δlnto* does not Granger Cause *Δlnrx* | 40 | | 15.6696 | 0.00033 | Rejected** |
| *Δlnrm* does not Granger Cause *Δlnto* | | 1 | 0.05878 | 0.80978 | Accepted |
| *Δlnto* does not Granger Cause *Δlnrm* | 40 | | 6.84319 | 0.01280 | Rejected** |
| *Δlntot* does not Granger Cause *Δlnto* | | 1 | 5.51684 | 0.02429 | Rejected* |
| *Δlnto* does not Granger Cause *Δlntot* | 40 | | 6.4E-05 | 0.99368 | Accepted |
| *Δlnrer* does not Granger Cause *Δlnto* | | 1 | 0.05340 | 0.81852 | Accepted |
| *Δlnto* does not Granger Cause *Δlnrer* | 40 | | 6.17867 | 0.01757 | Rejected** |
| *Δlnri* does not Granger Cause *Δlnto* | | 5 | 1.36733 | 0.27002 | Rejected |
| *Δlnto* does not Granger Cause *Δlnri* | 36 | | 0.63004 | 0.67852 | Accepted |

Note: The test is performed with the software Eviews 5.1.
*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.

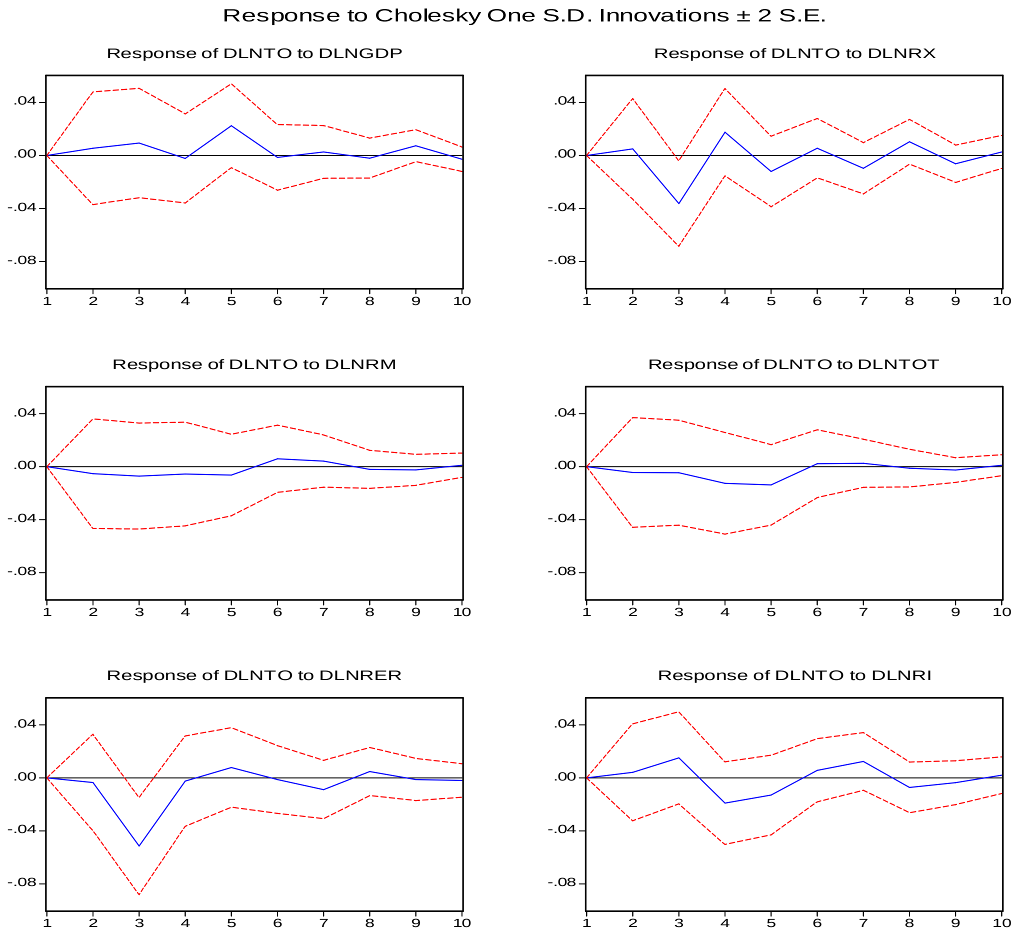
Table 9.8.1 shows the pair wise Granger causality. Result shows that GDP does not cause trade openness. That is, causation does not go from GDP to trade openness in Bangladesh as the null hypothesis is insignificant. From this result, it can be said that GDP does not lead trade openness in Bangladesh but trade openness leads GDP to grow as the F-statistics is rejected at 0.05 levels. Table further shows that both the variables trade openness and real export cuase each other to grow as the F-statistics are statistically significant at 5 and 1 percent level for both cases. So, the null hypotheses of no causations are rejected. That is, both trade openness and real exports in Bangladesh cause each other to grow at the same tandem. The third row of the table indicates that the null hypothesis of real import does not Granger cause trade openness is accepted as the F-statisitics is insignificant while null hypothesis of trade openness does not Granger cause real import is rejected as F- statistics is significant. That means, real import does not cause trade openness to grow but trade openness leads real import in Bangladesh to grow. The terms of trade casues trade openness to grow as the null hypothesis is rejected but the null hypothesis of trade openness does not Granger cause terms of trade accepted as the F-statistics is insignificant at 0.05 levels. Real exchange rate does not cause trade openness as the null hypothesis is accepted while the F-statistics is significant for rejecting the null hypothesis of trade openness does not Granger cause real exchange rate. That implies that real exchange rate does not lead trade openness in contrast, trade openness leads real exchange rate in Bangladesh to grow. In the similar fashion, the null hypothesis of real inflation does not Granger cause trade openness is rejected as the F-statistics is significant while trade openness does not Granger cause real inflation is accepted as F-statistics is insignificant. That is, real inflation leads trade openness but trade openness does not lead real inflation in Bangladesh in the short run. Thus, there are bidirectional causalities between trade openness and real exports in Bangladesh. Otherwise, unidirectional causality exist between the pair-wise residual independent variables to trade openness in the short run.

### 9.9 Result of Impulse Response Analysis of the Variables in the VAR Model

The impulse responses imply that the dependent variable is well responded to the independent variables and a long run convergence is established. It shows how a one-time positive shock of one standard deviation (± 2 S. E. innovations) to the GDP, real export, real import, terms of trade, real exchange rate and the real inflation endures on the trade openness in Bangladesh.

Figure 9.9.1 presents the impulse response in the trade openness to the GDP *(Δlngdp)*, the real export *(Δlnrx)*, the real import *(Δlnrm)*, the terms of trade *(Δlntot)*, the real exchange rate *(Δlnrer)*, and the real inflation rate *(Δlnri)* in the Bangladesh for the post-independent era. Figure 9.9.1(a) presents the response of trade openness to GDP which reveals that it was always favourable or at least has a non negative effect on trade openness over the period. Figure 9.9.1(b) presents a mixed effect of real export on trade openness that it is favourable in the second, fourth, sixth and eighth periods but negative in all other periods, thus this have a bad implication on the performances of Bangladesh economy. Likewise, real import had unfavourable effect in the first, fifth and eighth period but the bad implication decreases henceforth and both are converging each other. The terms of trade in figure 9.9.1(d) have the same implications like real import. Indeed, real exchange rate has a bad effect up to the fourth period on the trade openness indicated by figure 9.9.1(e), and also in seventh period but the negative implication decreases over the periods and both variables are converging each other. The real inflation has the negative impact in the fourth, fifth and eighth periods on trade openness indicated by the figure 9.9.1(f), otherwise it has slow positive and steady effects on trade openness. Hence, both variables are converging each other over the period.

**Figure 9.9.1.1: Impulse Responses of the TO Function in the VAR Model**




The IRA test is conducted with Eviews 5.1.
Note: *For researcher's convenience only 10 subsequent periods are considered.

Therefore, the response of all independent variables to trade openness is either positive or negative in the short run but in the long run they are responded towards the trade openness in Bangladesh. Diversification of responses of GDP, real exchange rate as well as real inflation is very high in the short run yet they have responded towards the same path in the long run. Overall, the impulse response function traces positive influence of the response variables on trade openness in Bangladesh.

## 9.10 Result of Variance Decompositions of the Trade Openness Function

**Table 9.10.1: Variance Decomposition Results of Trade Openness with VAR Model**

| Variance Decomposition of DLNTO: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Period | S.E. | DLNTO | DLNGDP | DLNRX | DLNRM | DLNTOT | DLNRER | DLNRI |
| 1 | 0.11 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.11 | 98.96 | 0.24 | 0.20 | 0.22 | 0.15 | 0.09 | 0.14 |
| 3 | 0.13 | 73.59 | 0.70 | 7.89 | 0.46 | 0.24 | 15.67 | 1.45 |
| 4 | 0.13 | 70.19 | 0.69 | 9.18 | 0.61 | 1.11 | 14.84 | 3.39 |
| 5 | 0.14 | 66.17 | 3.29 | 9.39 | 0.78 | 2.03 | 14.28 | 4.07 |
| 6 | 0.14 | 66.13 | 3.25 | 9.41 | 0.95 | 2.02 | 14.07 | 4.17 |
| 7 | 0.14 | 64.96 | 3.22 | 9.70 | 1.02 | 2.02 | 14.20 | 4.88 |
| 8 | 0.14 | 64.36 | 3.21 | 10.14 | 1.03 | 2.00 | 14.17 | 5.09 |
| 9 | 0.14 | 63.98 | 3.46 | 10.28 | 1.05 | 2.02 | 14.10 | 5.12 |
| 10 | 0.14 | 63.91 | 3.49 | 10.29 | 1.057 | 2.03 | 14.09 | 5.13 |
| Cholesky Ordering: DLNTO DLNGDP DLNRX DLNRM DLNTOT DLNRER DLNRI | | | | | | | | |

Results are drawn with software Eviews 5.1.
Note: Variance Decompositions are drawn with the first differenced data of Table 9.1.1 (in Appendix)

The variance decomposition outputs are reported in Table 9.10.1. It was documented that the variance of trade openness is always caused by 100 per cent by itself in the first year. In the second year, the foreign direct investment variance is decomposed into its own variance ( 98.96%) followed by GDP (0.24%), real export (0.20%), real import (0.22%), terms of trade (0.15%), real exchange rate (0.10%) and real inflation (0.14%). However, in subsequent years, the share of GDP increases to approximately 3.49% followed by the real export, real import, terms of trade, real exchange rate and real inflation are increased to (10.29%, 1.06%, 2.01%, 14.09% and 5.13% respectively). On the other hand, the share of trade openness in explaining the variance decomposition decreases gradually from the second year up to the tenth year. Summarily, the changes in trade openness are mainly caused by its own variation which by the end of the tenth year it could accounted for 63.91% less (i.e. 64%). The volatility of trade openness is mainly caused by its own variation, as it always accounts for major portion (above 64%) of the fluctuations.

## 9.11 Model Diagnostics of the Study

### 9.11.1 Results of Lagrange Multiplier (L-M) and Bruesh-Godfrey (B-G) Tests

**Table 9.11.1.1: Results of Autocorrelation and the Normality Tests**

| Tests | L-M Test Statistics | Probability | Conclusions |
|---|---|---|---|
| F-statistic | 3.064370 | 0.06584 | No Autocorrelation |
| Obs*R-squared | 6.5490 | 0.0371 | Normally Distributed |

Source: Results are drawn from the equation (9.5) and the tests are performed with software Eviews 5.1.

Table 9.11.1.1 indicates the results of the autocorrelation of the estimated domestic investment equation. In case of equation (9.5.1), both the probability values are greater than (α= 0.01). The F-statistics of the L-M test is 6.16 and the probability is 0.02, which is greater than 0.01. That is, the null hypothesis of autocorrelation is rejected. Likewise, Breusch–Godfrey serial correlation test reveals no autocorrelation among the variables (Obs*R-squared 6.45 with associated P-value 0.011). These imply that the estimated trade openness equation does not suffer from autocorrelation problem as well as the residuals follow the normality of the distribution.

### 9.11.2 Result of the White Grneral Heteroskedasticity Test

**Table 9.11.2.1: Results of the White General Heteroskedasticity Test**

| Tests | WH Test Statistics | Probability | Conclusion |
|---|---|---|---|
| F-statistic | 4.231845 | 0.004389 | No Heteroscedasticity |
| Obs*R-squared | 36.81172 | 0.098636 | Normally Distributed |

The test is performed with Eviews 5.1.

Table 9.11.2.1 shows that in case of the estimated trade openness function (9.5.1), both the probability is less than the critical value 0.05 and 0.10. The F-statistic of the White Heteroscedasticy test is 4.23 and respective probability is 0.004 which is smaller than the critical value (α) 0.05. This implies that the null hypothesis of no heteroscedasticity is accepted. That is, the equation (9.5.1) is free from heteroscedasticity problem. The Breusch–Pagan-Godfrey test also reveals homoscedasticity (Obs*R-square 36.81172 ith associated P-value 0.098 which is less than 0.10 level) of the distribution. Therefore, there is no heteroscedasticity problem as well as the estimated residuals are normally distributed.

### 9.11.3 Results of the Stability Tests

The CUSUM and CUSUMSQ tests have been applied for checking the structural problem of the time series data of the estimated regression model (9.5.1). The results of these tests are as follows:

**Figure 9.11.3.1: Result of the CUSUM Test**

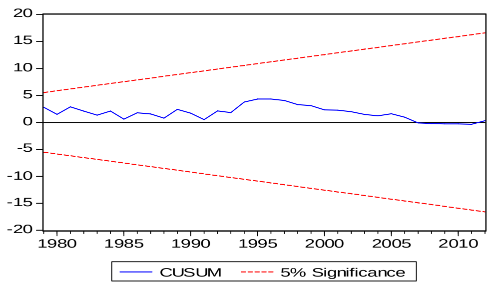
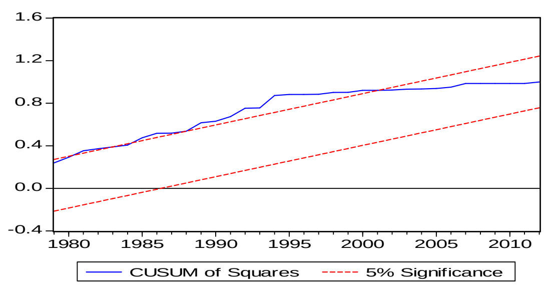



**Figure 9.11.3.2: Result of CUSUMSQ Test**




The tests are performed with Eviews 5.1.

The result of CUSUM test in figure (9.11.3.1) shows that the statistic stays within the 95 percent confidence interval. That is, there is no structural break of the model over the period. Figure 9.11.3.2 on the other hand, indicates that the statistics of CUSUMSQ test begins from inside of the confidence interval but after 1990, it crosses the confidence interval and remains outside of the interval. In 2000, it falls again inside the 95 percent interval. These imply that estimates and the variation of the estimates of the model have the short term structural breaks but are stable over the period. Thus, a short term structural change is found in the trade openness model. Finally, it could be concluded that the models are structurally stable and specified in the study. So, the parameters could be used for policy purposes study safely.

### 9.12 Conclusion

The objective of this chapter is to asses the inlfuences of different components of trade openness as well as to examine the causal relationships associated with them at the disaggregated level in Bangladesh. In doing so, a complete econometric procedure has been carried out in this chapter. The stability and structural breaking point have been analyzed first that ensures no structural breaking point and higher instability index in the pre-liberalization periods. The time series properties are justified and found the data stationary at first difference form (integrated of order one) with the correlogram, ADF, D-F (GLS), and Phillips-Perron tests. Johansen Maximum Likelihood method that includes the trace and max-eigen value tests has been applied for cointegration test. Results show that there are two cointegrated long run stable relations between the pair-wise components and trade openness in Bangladesh. The OLS estimated coefficients of the trade openness function indicate that trade openness in Bangladesh is obviously positively influenced by GDP, real export, real import, real exchange rate but significantly negatively influenced by the terms of trade and real inflation in Bangladesh.

The Vector Error Correction Modeling (VECM) results show that the long run relationships exist between real export, real import, terms of trade and real inflation to trade openness in Bangladesh. The short run relationships on the other hand, exist between the factors GDP, real exchange rate and trade openness in Bangladesh. There is short run dynamics with long run equilibrium between the pair-wise variables like, real export, real import, terms of trade, real exchange rate and real inflation with trade openness in Bangladesh. The VAR analysis shows that the long run significant elasticities exist between real export, terms of trade to trade openness in Bangladesh while the short run elasticities exist between real imports, real exchange rate to trade openness in Bangladesh. They may either be positive or negative. Granger Causality test indicates that there are bidirectional causalities between trade openness and real exports in Bangladesh. That is, they cause each other to grow at the same tandem. Otherwise, there is unidirectional causality between the pair-wise variables i.e. GDP, export, import, terms of trade, exchange rate, and real inflation to the trade openness in Bangladesh. The Impulse Response Analysis (IRA) confirms that 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 trade openness in Bangladesh. Finally, the model diagnostic tests make the results of the econometric analysis robust and valid.

# Chapter Ten: Empirical Results of GDP Growth Function

## 10. Introduction

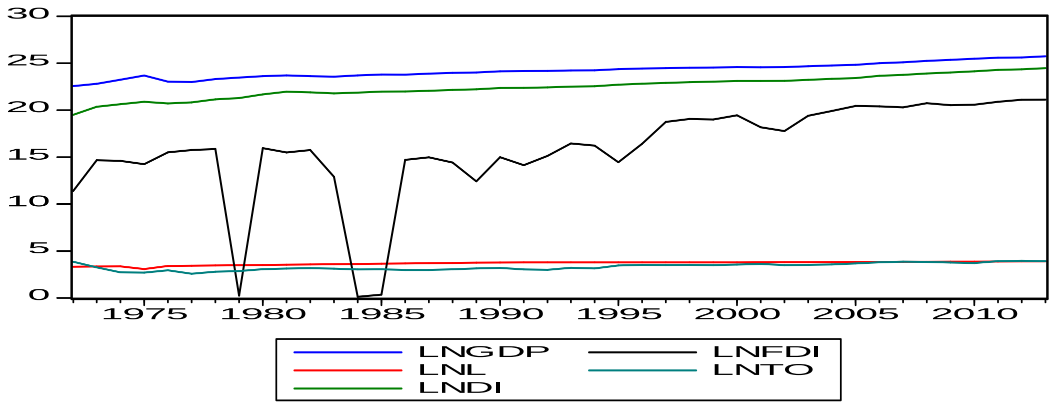
The main objective of this study is to assess the impact of stock of labour proxy of the active population ages 15 to 64 years % of total population, domestic investment proxy of gross capital formation, FDI and trade openness on economic growth in Bangladesh as well as to examine the causal relationships associated with them. In this context, a complete econometric procedure has been carried out throughout this chapter so that the objectives are to be met up and the hypotheses are to be tested accordingly. In this context, the pre-estimation techniques like, the Chow test, the Coppock Instability Index, statistical descriptions, the correlation matrix and the normality tests (J-B test) have been applied first. The stationarity of the data has been tested by applying various unit root tests like, the correlogram, the ADF, the D-F (GLS) and the Phillips-Perron tests. The long run cointegrated relationships have also been justified by Johansen Maximum Likelihood method that includes the trace and max-eigen value tests. The GDP growth function has been estimated by OLS method to assess the impact of the factors on economic growth in Bangladesh. The short and long run elasticities, the causal relationships associated with these factors and the response of GDP growth to the different components have also been examined throughout this chapter. Besides, various post estimation model diagnostic tests have also been carried out. In this context, the popular econometric software Eviews 5.1 has been performed basically.

## 10.1 Trend of Independent Variables of the GDP Growth Function

In order to assess the nature and trends of independent variables the graphical presentation method is very much popular. The results of this method are given by the following figure.

Figure 10.1.1 presents the trends and nature of the variables of GDP growth function. It indicates that the first two variables (GDP and domestic investment) indicated by upper first two lines those have almost same slopes showing the same trends of growth. That is, GDP and domestic investment in Bangladesh are increasing at the same tandem but there is a clear gap between GDP and domestic investment. The increasing trend of stock of labour is very much slower from 1990 as the population growth rate decreases for the implementation of population policy in Bangladesh. The FDI variable has also the upward trend but it falls drastically in 1979, 1984 and 1985 otherwise its pace remains upward rising with little fluctuations. The labour force ratio along with trade openness in Bangladesh have almost same and steady pace of increasing over the period. But the FDI inflow in Bangladesh is much lower than many other South Asian countries.

**Figure 10.1.1: Trends of the Independent Variables of the GDP Growth Function**




Source: Table 10.1.1(in Appendix). The figure is drawn with Eviews 5.1

Figure also presents that the degree of trade openness is increased but the rising pace is very slow. It is due to country's trade barriers. The variables are however have positive and increasing trend over the periods.

## 10.2 Structural Changes of GDP Growth in Bangladesh

### 10.2.1 Result of the Chow Test

As the pre-estimation technique, the Chow test is conducted to measure the structural breakpoint changes in the GDP growth in Bangladesh. The results of the Chow test are shown below:

**Table 10.2.1: Result of the Structural Breakpoint of the GDP Growth Function**

| Chow Breakpoint Test: 1990 | | | |
|---|---|---|---|
| F-statistic | 3.944871 | Prob: (2, 42) | 0.006716 |
| Log likelihood ratio | 20.16810 | Prob: Chi-square (2) | 0.001162 |

Source: Estimated from the Table: 10.1.1 (in Appendix). The tests are performed with Eviews- 5.1.

Table 10.2.1 presents that the results confirm 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 ($\alpha$). Since, the p-value is very small the null hypothesis has been statistically significant. Hence, there is no structural breaking point of GDP growth in 1990 in Bangladesh.

### 10.2.2 Result of the Coppock Instability Index

The instability of GDP growth in Bangladesh is estimated by using Coppock Instability Index that indicates the high index value is the more instability of the model. The result of CII is shown by the following table:

**Table 10.2.2: Coppock Instability Index of GDP Growth in Bangladesh**

| Period | Coppock Instability Index (CII) in % |
|---|---|
| Pre-Liberalization | 21.7 |
| Post-Liberalization | 12.5 |
| Overall | 17.1 |

Note: CII= [Antilog $\sqrt{Variance - 1}$]*100.

Source: Own estimated from the Table 10.1.1 (in Appendix).

Table 10.2.2 shows that the CII is 21.7 percent during the pre-liberalization regime and 12.5 percent during the post-liberalization regime. Therefore, it is clear that 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.

### 10.2.3 Descriptive Statistics of the GDP Growth Function

**Table 10.2.3: Descriptive Statistics of the GDP Growth Function in Bangladesh**

| | LNGDP | LNL | LNDI | LNFDI | LNTO |
|---|---|---|---|---|---|
| Mean | 24.22 | 3.69 | 22.47 | 15.83 | 3.34 |
| Median | 24.20 | 3.79 | 22.47 | 15.91 | 3.24 |
| Maximum | 25.73 | 3.90 | 24.47 | 21.13 | 3.97 |
| Minimum | 22.56 | 3.09 | 19.50 | 0.124 | 2.59 |
| Std. Dev. | 0.79 | 0.19 | 1.17 | 5.13 | 0.38 |
| Skewness | 0.05 | -1.21 | -0.32 | -1.87 | 0.01 |
| Kurtosis | 2.42 | 3.80 | 2.66 | 6.64 | 1.91 |
| Jarque-Bera | 0.61 | 11.39 | 0.94 | 47.64 | 2.079 |
| Probability | 0.74 | 0.01 | 0.63 | 0.00 | 0.35 |
| Sum | 1017.09 | 155.13 | 943.55 | 664.95 | 140.10 |
| Sum Sq. Dev. | 25.48354 | 1.495336 | 56.29428 | 1078.386 | 5.942555 |
| Observations | 42 | 42 | 42 | 42 | 42 |

Source: Estimated from the Table 10.1.1. *Data have been rounded within 2 digits after decimal.

Table 10.2.3 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. The Sum and Sum Sq. Dev. ensures that there is no structural break of the data. Thus, the normality of the distribution is ensured in the study.

### 10.2.4 Correlation among the Variables of GDP Growth Function

**Table 10.2.4: The Correlation Matrix of the Variables of GDP Growth Function**

| | LNGDP | LNL | LNDI | LNFDI | LNTO |
|---|---|---|---|---|---|
| LNGDP | 1 | 0.8498 | 0.9850 | 0.6036 | 0.7616 |
| LNL | 0.8498 | 1 | 0.9036 | 0.4645 | 0.6689 |
| LNDI | 0.9850 | 0.9036 | 1 | 0.5863 | 0.7358 |
| LNFDI | 0.6036 | 0.4645 | 0.5863 | 1 | 0.5750 |
| LNTO | 0.7616 | 0.6689 | 0.7358 | 0.5750 | 1 |

*Data have been rounded within 4 digits after decimal.

Table 10.2.4 shows the correlations among the variables of GDP growth function in Bangladesh. The correlation between GDP and stock of labour is 0.85, while the correlations between GDP and domestic investment, foreign direct investment and trade openness are 0.99, 0.60 and 0.76 respectively. 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. Thus, economic growth in Bangladesh is always positively influenced by its various components (*lnl, lndi, lnfdi, and lnto*).

## 10.3 Results of Unit Root Tests of the GDP Growth Function

If the variables (*lngdp, lnl, lndi, lnfdi, and lnto*) are non-stationary at levels they all have unit root problem and suffer from instability problem in the short run. Then, it is necessary to test the data in the first difference and also in the second difference and soforth. The popular unit root test like, the correlogram test, the Augmented Dickey-Fuller test, the D-F (GLS) test and the Phillips-Perron test have been applied to justify the unit root problem of the time series data. The results of these tests are as follows:

### 10.3.1 Result of the Correlogram Test

The results of the correlogram test with level and first difference form are given below. If the correlogram statistics are less than the variances of the term, the hypothesis of the non-stationarity of the data will be rejected otherwise accepted.

**Table 10.3.1.1: Results of Correlogram Test of GDP (*lngdp*) in the Level Form**

| Autocorrelation | Partial Correlation | Lag | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| . \|****** \| | . \|****** \| | 1 | 0.793 | 0.793 | 28.332 | 0.000 |
| . \|***** \| | . \| . \| | 2 | 0.615 | -0.036 | 45.818 | 0.000 |
| . \|**** \| | . \|*. \| | 3 | 0.502 | 0.068 | 57.758 | 0.000 |
| . \|*** \| | . \|*. \| | 4 | 0.447 | 0.098 | 67.486 | 0.000 |
| . \|*** \| | .*\| . \| | 5 | 0.371 | -0.062 | 74.365 | 0.000 |
| . \|** \| | . \| . \| | 6 | 0.298 | -0.008 | 78.938 | 0.000 |
| . \|** \| | . \| . \| | 7 | 0.241 | -0.000 | 81.994 | 0.000 |
| . \|*. \| | . \| . \| | 8 | 0.191 | -0.024 | 83.984 | 0.000 |
| . \|*. \| | . \| . \| | 9 | 0.160 | 0.026 | 85.426 | 0.000 |
| . \|*. \| | . \| . \| | 10 | 0.140 | 0.016 | 86.560 | 0.000 |
| . \|*. \| | . \| . \| | 11 | 0.111 | -0.028 | 87.298 | 0.000 |
| . \|*. \| | . \| . \| | 12 | 0.079 | -0.017 | 87.679 | 0.000 |
| . \| . \| | . \| . \| | 13 | 0.056 | 0.000 | 87.882 | 0.000 |
| . \| . \| | . \| . \| | 14 | 0.042 | -0.005 | 87.999 | 0.000 |

The test is performed with Eviews 5.1.

Table 10.3.1.1 shows the sample correlogram of gross domestic products (*lngdp)* in Bangladesh at the level. It shows the correlogram up to 14 lags. The striking feature of this sample correlogram is that it starts at high value (about 0.793 at lag 1) and then tapers off gradually. At lag 5 the autocorrelation coefficient is 0.371. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n*, where *n* is sample size. Since, the number of observation is *42*, implying a variance of *1/42* or about (*0.0238*) and the standard error is $\sqrt{0.0238}$= *0.1543*. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1543)\,]$ = ± 0.303. The estimated coefficients up to lag *5* fall outside the interval. This implies that the null hypothesis cannot be rejected and the data series is non-stationary. Similar results have been found for the data of stock of labour, domestic investment, FDI and trade openness from the correlogram test. That is, the data of these variables are also non-stationary at the level form. Thus, for having stationarity of the data it is required to test them at the first difference. The results of first differenced corrlogram test are:

Table 10.3.1.2 presents the sample correlogram of gross domestic products *(Δlngdp)* in the first difference. The sample autocorrelation coefficients are approximately normally distributed with zero mean and variance *1/n*, where *n* is sample size. Since, the number of observation is *41* after first difference, implying a variance of *1/41* or about (*0.0244*) and the standard error is $\sqrt{0.0244}$= *0.1562*. Therefore, the properties of the normal distribution, the 95% confidence interval for $\hat{\rho}_k$ is $[\,0 \pm 1.96(0.1562)\,]$ = ± *0.306.* All the estimated coefficients fall inside of the interval except lag 2. Therefore, the null hypothesis can be rejected at 5% significance level because majority of the lag values fall inside the confidence interval. This implies that the series is stationary after the first difference because the unit root problem has been vanished then.

**Table 10.3.1.2: Results of Correlogram Test of GDP *(Δlngdp)* in the First Difference**

| Autocorrelation | Partial Correlation | Lag | AC | PAC | Q-Stat | Prob |
|---|---|---|---|---|---|---|
| . \| . \| | . \| . \| | 1 | 0.038 | 0.038 | 0.0639 | 0.800 |
| ***\| . \| | ***\| . \| | 2 | -0.414 | -0.416 | 7.8011 | 0.020 |
| .*\| . \| | .*\| . \| | 3 | -0.133 | -0.115 | 8.6261 | 0.035 |
| . \| . \| | **\| . \| | 4 | -0.001 | -0.203 | 8.6262 | 0.071 |
| . \|*. \| | . \| . \| | 5 | 0.079 | -0.033 | 8.9352 | 0.112 |
| . \|*. \| | . \|*. \| | 6 | 0.192 | 0.119 | 10.799 | 0.095 |
| . \| . \| | . \| . \| | 7 | 0.041 | 0.060 | 10.886 | 0.144 |
| .*\| . \| | . \| . \| | 8 | -0.153 | -0.007 | 12.133 | 0.145 |
| . \| . \| | . \|*. \| | 9 | -0.029 | 0.076 | 12.179 | 0.203 |
| . \|*. \| | . \|*. \| | 10 | 0.086 | 0.067 | 12.595 | 0.247 |
| . \| . \| | . \| . \| | 11 | -0.037 | -0.052 | 12.676 | 0.315 |
| . \| . \| | . \| . \| | 12 | -0.003 | 0.017 | 12.676 | 0.393 |
| . \| . \| | .*\| . \| | 13 | -0.010 | -0.076 | 12.683 | 0.473 |
| . \| . \| | . \| . \| | 14 | -0.043 | -0.040 | 12.804 | 0.542 |

The test is performed with Eviews- 5.1.

Similar results have also been found from the correlogram test for the rest of variables (labour, domestic investment, FDI and trade openness) of the GDP growth function that is, they all have been found stationary at the first difference as the unit root problem has been vanished then. Therefore, the correlogram results show that the time series data is non-stationary at the level form because all autocorrelation coefficients remain outside the range of the sample variances that reject null hypothesizes. But, they all fall inside the range of sample variance (1/n) at the first difference, the data then have been stationary. That is, they are integrated of order one *I(1)*.

### 10.3.2 Result of the Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey-Fuller test is popularly used to test the existence of unit roots and to determine the order of integration of the variables. The tests are done both with and without a time trend. Results are shown in the Table 10.3.2.

Table 10.3.2 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 further 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)*. Table further shows the adjustment coefficient $R^2$ (the goodness of fit) that indicates that the data adjustment provides a high rates of fit for the data series after the first difference whereas, they were insignificant in the level form. The

Durbin Watson *d* statistic indicates that the level of autocorrelation in the data series. It shows that each of data series contains a high level autocorrelation in the level form but the autocorrelation problems have been reduced significantly in many cases from the data series after the first difference.

**Table 10.3.2: Result of the Augmented Dickey-Fuller (ADF) Unit Root Test**

| Variable | Lag | With An Intercept But Not A Trend | | | | | With An Intercept And A Linear Trend | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ADF Stat. | Crit. Value (1%) | Crit. Value (5%) | $R^2$ Value | *d* Value | ADF Stat. | Criti. Value (1%) | Crit. Value (5%) | $R^2$ Value | *d* Value |
| lngdp | 3 | 2.4210 | -3.6156 | -2.9411 | 0.5469 | 0.9638 | -0.7696 | -4.2191 | -3.5331 | 0.5629 | 1.7807 |
| lnl | 1 | -1.1353 | -3.6056 | -2.9369 | 0.0320 | 1.8702 | -5.2047 | -4.2050 | -3.5266 | 0.4304 | 2.1405 |
| lndi | 1 | -0.5070 | -3.6056 | -2.9369 | 0.0912 | 2.0186 | -2.5331 | -4.2050 | -3.5266 | 0.2242 | 1.8492 |
| lnfdi | 7 | -1.5347 | -3.6268 | -2.9458 | 0.6176 | 1.9473 | -3.0957 | -4.2350 | -3.5403 | 0.6967 | 2.0059 |
| lnto | 7 | -1.4012 | -3.6010 | -2.9350 | 0.0479 | 1.2783 | -3.3283 | -4.2119 | -3.5298 | 0.2733 | 2.0231 |
| Δlngdp | 1 | -7.4781 | -3.6105 | -2.9390 | 0.6412 | 2.3355 | -7.3982 | -4.2117 | -3.5298 | 0.6459 | 2.3684 |
| Δlnl | 1 | -7.5982 | -3.6105 | -2.9390 | 0.6469 | 2.3658 | -7.4806 | -4.2119 | -3.5298 | 0.6495 | 1.4292 |
| Δlndi | 1 | -7.7713 | -3.6056 | -2.9369 | 0.6138 | 2.0527 | -7.4129 | -4.2050 | -3.5266 | 0.6139 | 2.0471 |
| Δlnfdi | | -7.2476 | -3.6105 | -2.9390 | 0.7688 | 2.1605 | -7.1538 | -4.2119 | -3.5298 | 0.7691 | 2.1619 |
| Δlnto | 1 | -6.1999 | -3.6056 | -2.9369 | 0.5029 | 2.3692 | -6.0794 | -4.2050 | -3.5266 | 0.5091 | 2.3287 |

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).

The results of ADF test thus states that the data of all variables are non-stationary at the level as they all suffers with unit root problems. After first difference the ADF tests are significant for every case that is, they all are stationary because the unit root problems are vanished then. That is they all are integrated of order one *I(1).*

### 10.3.3 Result of D-F (GLS) Test

**Table 10.3.3: Results of the D-F (GLS) Unit Root Test**

| Variables | Lag | With An Intercept But Not A Trend | | | With An Intercept And A Linear Trend | | |
|---|---|---|---|---|---|---|---|
| | | D-F GLS Statistic | Critical Value (1%) | Critical Value (5%) | D-F GLS Statistic | Critical Value (1%) | Critical Value (5%) |
| lngdp | 1 | 0.8565 | -2.6226 | -1.9491 | -3.5109 | -3.7700 | -3.1900 |
| lnl | 1 | 0.7279 | -2.6241 | -1.9493 | -3.6327 | -3.7700 | -3.1900 |
| lndi | | 2.1110 | -2.6241 | -1.9493 | -1.5090 | -3.7700 | -3.1900 |
| lnfdi | 5 | -0.3853 | -2.6290 | -1.9501 | -4.6303 | -3.7700 | -3.1900 |
| lnto | 1 | -1.3221 | -2.6241 | -1.9493 | -1.9974 | -3.7700 | -3.1900 |
| Δlngdp | 1 | -5.1401 | -2.6241 | -1.9493 | -6.3831 | -3.7700 | -3.1900 |
| Δlnl | 1 | -5.0535 | -2.6241 | -1.9493 | -6.3927 | -3.7700 | -3.1900 |
| Δlndi | 0 | -1.8432 | -2.6241 | -1.9493 | -3.4013 | -3.7700 | -3.1900 |
| Δlnfdi | 1 | -7.4255 | -2.6241 | -1.9493 | -6.1607 | -3.7700 | -3.1900 |
| Δlnto | 0 | -2.5362 | -2.6241 | -1.9493 | -4.2600 | -3.7700 | -3.1900 |

The test is conducted with Eviews 5.1; Data have been 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).

Table 10.3.3 indicates that the time series data of growth function have however been non-stationary at the level form because the D-F (GLS) statistics are less than their critical value at both 1 and 5 percent level of significance. Therefore, the null hypothesizes of unit root problems have been accepted. 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)*.

### 10.3.4 Result of the Phillips-Perron Test

**Table 10.3.4: The Result of Phillips-Perron Unit Root Test**

| Variables | With An Intercept But Not A Trend | | | With An Intercept And A Linear Trend | | |
|---|---|---|---|---|---|---|
| | PP Statistic | Critical Value (1%) | Critical Value (5%) | PP Statistic | Critical Value (1%) | Critical Value (5%) |
| lntgdp | -0.8804 | -3.6010 | -2.9350 | -4.0449 | -4.1985 | -3.5236 |
| lnl | -1.1151 | -3.6010 | -2.9350 | -4.2920 | -4.1985 | -3.5236 |
| lndi | -2.5623 | -3.6010 | -2.9350 | -5.6762 | -4.1985 | -3.5236 |
| lnfdi | -3.1872 | -3.6010 | -2.9350 | -4.4276 | -4.1985 | -3.5236 |
| lnto | -1.6509 | -3.6010 | -2.9350 | -7.3837 | -4.1985 | -3.5236 |
| Δlngdp | -11.0380 | -3.6056 | -2.9369 | -10.8639 | -4.2050 | -3.5266 |
| Δlnl | -10.1894 | -3.6056 | -2.9369 | -10.0497 | -4.2050 | -3.5266 |
| Δlndi | -7.7713 | -3.6056 | -2.9369 | -7.4129 | -4.2050 | -3.5266 |
| Δlnfdi | -14.4624 | -3.6056 | -2.9369 | -15.1876 | -4.2050 | -3.5266 |
| Δlnto | -6.4890 | -3.6056 | -2.9369 | -6.2760 | -4.2050 | -3.5266 |

The test is conducted with Eviews 5.1; Data have been 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).

Table 10.3.4 shows the level values as 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; because the PP statistics are greater than their critical values at 1% and 5% level of significance and the null hypothesis of non-stationarity are rejected. 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. These suggest that the series are integrated of order one *I(1)*. Therefore, the null hypothesizes of unit root problems have been accepted. But the problems have been vanished after the first difference because the null hypothesizes have been rejected then and the data becomes stationary for the integration of order one *I(1)*. The time series data of GDP function have however been non-stationary at the level form because the ADF, D-F (GLS) and PP-statistics are less than their critical values but they all have been found stationary at the first difference.

## 10.4 Result of the Cointegration Test of the GDP Growth Function

Since the variables *lngdp, lnl, lndi, lnfdi, and lnto* (gross domestic products, stock of labour force, domestic investment, net inflows of foreign direct investment, and trade openness, respectively) are integrated of order 1 (one), it confirms the possibility of cointegration between them. Cointegration method usually uses two test statistics for testing the cointegration: the trace ($T_r$) test and the max-eigen value ($\lambda_{max}$) test. The results of contegration tests are presented by the Table 10.4.1 to Table 10.4.4.

**Table 10.4.1: Cointegration Result between GDP and Stock of Labour**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max- eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| 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* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 10.4.1 presents that the trace and max-eigen value statistics for gross domestic products ($\Delta lngdp$) and stock of labour force in Bangladesh ($\Delta lnl$) are 85.92 and 64.99for the null hypothesis r= 0; both the values are greater than their critical values of 15.49 and 14.26 at 5% ( with 0.0000 probability) levels of significance. Thus, the null hypothesis of no cointegration is rejected and the alternative hypothesis is accepted. In the second row of the table, both the trace and max-eigen value statistics are also greater than the critical values at 5 % significant level. Hence, the null hypothesis of no cointegration is rejected. Thus, there are 2 (two) cointegrating stable relations between GDP and stock of labour force in Bangladesh.

**Table 10.4.2: Cointegration Result between GDP and Domestic Investment**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max- eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.7463 | 68.9256 | 15.4947 | 0.0000 | 53.4904 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.3268 | 15.4352 | 3.8415 | 0.0001 | 15.4352 | 3.8415 | 0.0001 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 10.4.2 finds that the trace and max-eigen value statistics for GDP ($\Delta lngdp$) and domestic investment in Bangladesh ($\Delta lndi$) are 68.93 and 53.49for the null hypothesisr=0; both the values are greater than the critical values of 15.49 and 14.26 at 5% ( with 0.0000 and 0.0001 probability) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. The trace and max-eigen value statistics are also greater than their critical values at 5 % significance level. Hence, the null hypothesis of no cointegration is rejected. Thus, there are 2 (two) cointegrating stable relations between gross domestic products and domestic investment in Bangladesh. The result is supported by Wadud (2005).

**Table 10.4.3: Cointegration Result between GDP and Foreign Direct Investment**

| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max-eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6408 | 68.3841 | 15.4947 | 0.0000 | 39.9340 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.5178 | 28.4501 | 3.8415 | 0.0000 | 28.4501 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 10.4.3 shows that the trace and max-eigen value statistics for GDP ($\Delta lngdp$) and FDI ($\Delta lnfdi$) in Bangladesh are 68.38 and 39.93for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% (with 0.0000 probabilities) levels of significance in the first row. Thus, the null hypothesis of no cointegration is rejected. In the second row of the table, the trace and max-eigen value statistics are also greater than the critical values at 5 % significance level. Hence, the null hypothesis of no cointegration is rejected. Thus, there are 2 (two) cointegrating stable relations between gross domestic products and foreign direct investment in Bangladesh. The result is supported by Rahman & Shahbaz (2011) while contradicted with Hossain & Kamal (2012); and Shafiun et al., (2009).

**Table 10.4.4: Cointegration Result between GDP and Trade Openness**

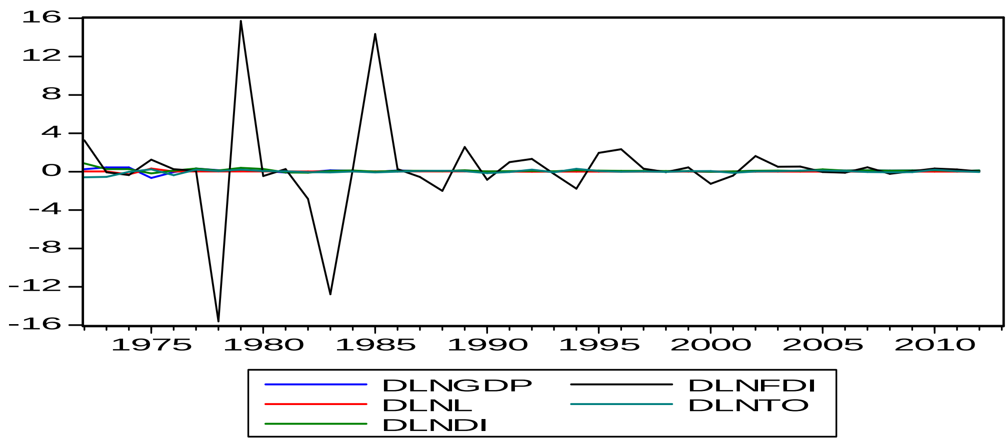
| $H_0$ | $H_A$ | Eigen Value | Trace Statistic | 5% Crit. Value | Probability** | Max- eigen Value | 5% Crit. Value | Probability** | Hypothesis |
|---|---|---|---|---|---|---|---|---|---|
| r=0 | r=1 | 0.6035 | 60.2086 | 15.4947 | 0.0000 | 36.0759 | 14.2646 | 0.0000 | None* |
| r<=1 | r=2 | 0.4614 | 24.1327 | 3.8415 | 0.0000 | 24.1327 | 3.8415 | 0.0000 | Atmost 1* |

The tests are performed with the software Eviews- 5.1
The Trace and Max-eigen value tests indicate 2 cointegrating eqn(s) at the 0.05 level.
Note: * denotes the rejection of the hypothesis at 0.05 levels. **MacKinnon-Haug-Michelis (1999) p-values.

Table 10.4.4 states that the trace and max-eigen value statistics for GDP ($\Delta lngdp$) and trade openness ($\Delta lnto$) of Bangladesh are 60.21 and 36.08for the null hypothesis r = 0; both the values are greater than the critical values of 15.49 and 14.26 at 5% (with 0.0000 probability) levels of significance. Thus, the null hypothesis of no cointegration is rejected at 5 percent significance level. In the second row of the table, both the trace and max-eigen value statistics are also greater than the critical values at 5 % significance level. Hence, the null hypothesis of no cointegration is rejected. Thus, there are 2 (two) cointegrating stable relations between gross domestic products and trade openness in Bangladesh in the short run. The result is also supported by Rahman & Shahbaz (2011) while contradicted with Hossain & Kamal (2012).

Figure 10.4.1 shows that there are two cointegrated long run relationships between GDP *($\Delta lngdp$)* and its various components in Bangladesh. The figure indicates that the lines are moving towards the right with different trends but they are remaining at the same range. The GDP line becomes steadier than the trade openness line in the country. This means that both GDP and trade openness have static and steady streams because they are converging each other over the period. The FDI line is very much fluctuated with the passage of time and it was negative in the year 1979, 1984 and 1985 in Bangladesh but its slope is positive to the right in the long run and converging towards the rest of the variables of the GDP growth function. Thus, there are 2 cointegrateing long run stable relationships between stock of labour, domestic investment, FDI and trade openness to the economic growth in Bangladesh.

**Figure 10.4.1: Cointegrated Relationships between GDP and Its Components**




The Figure is drawn with first differenced data of Table 10.1.1.

Since, the data of the function are stationary at the first difference, the cointegrated relationships of the differenced variables have been justified and they all have been contegrated in the long run. This result contradicts with Hossain & Kamal (2012). It is due to the variation of sample selection, data range, methodology and the analyzing techniques of the researcher. Hence, there are 2 (two) cointegrating stable relations between pair-wise variables and they are converging each other in the long run.

### 10.5 Estimation of GDP Growth Function by OLS

Under certain assumptions, the least squares method has some very attractive statistical properties that have made it one of the powerful and popular methods of regression analysis. With the satisfaction of these assumptions the ordinary least squares method has been appropriated for estimating GDP growth function (6.2.4.2).

The estimated GDP growth regression model is:

$$\Delta lngdp=-0.054859+8.628111\Delta lnl+0.707270^{**}\Delta lndi-0.007299\Delta lnfdi-0.064531\Delta lnto \quad \ldots\ldots(10.5.1)$$

| | | | | |
|---|---|---|---|---|
| (0.048445) | (6.597943) | (0.139099) | (0.004181) | (0.121565) |
| [-1.132397] | [1.307697] | [5.084669] | [-1.745719] | [-0.530838] |
| (0.2650) | (0.1993) | (0.0000) | (0.0894) | (0.5988) |

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;
The *t*-statistics are shown by the parenthesis.

The estimated coefficients of the GDP growth function indicate that they all are related with GDP growth in Bangladesh, either they may be positive or negative. Result shows that GDP of Bangladesh is obviously influenced by its factors. But, the stock of labour and domestic investment positively affects GDP of Bangladesh, of which the effect of domestic investment is significant. That is, an increase in stock of labour, GDP will be insignificantly increased by 8.63 percent. Again, an increase in domestic investment GDP growth 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. Thus, labour force in Bangladesh positively affects GDP but 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, 2006; Hossain & Kamal, 2012; Bhavan, 2011; Ahmad & Fahian, 2010; Beugelsdijk et al., 2008; Shujie & Kailei, 2006; Yao, 2006; Hermes & Lensink, 2003; Borensztein et al., 1998; Bengoa & Blanca, 2003; Nunnenkamp et al., 2004; Laura et al., 2000; 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 researcher.

### 10.5.1 Result of the Wald Test

Table 10.5.1 indicates the Wald test of the growth function (10.5.1) which 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. That is, the critical values of both F-statistic and Chi-square test are less than the critical values that ensure the rejection of the null hypothesis of insignificant coefficients. Table thus, indicates that the variables are jointly significant at both 0.05 and 0.01 levels for the GDP growth in Bangladesh.

**Table 10.5.1: Result of the Wald Test of Coefficients of Restrictions**

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| F-statistic | 15.14667 | (2, 36) | 0.0000 |
| Chi-square | 30.29334 | 2 | 0.0000 |
| Null Hypothesis Summary | | | |
| Normalized Restriction (= 0) | | Value | Std. Err. |
| C(1) | | -0.054859 | 0.048445 |
| C(3) - 2*C(4) | | 0.721869 | 0.141237 |

Note: Restrictions are linear in coefficients. The test is performed with Eviews 5.1.

### 10.6 Result of the VECM of GDP Growth Function

A significant lagged ECT coefficient implies that past equilibrium errors affect current outcomes. The long run effects of the variables in question can be represented by the estimated cointegration vector. The cointegrating long run error correction results are shown by the following Table 10.6.1 to Table 10.6.4.

**Table 10.6.1: Result of VECM for GDP and Stock of Labour (*Δlngdp, Δlnl*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lngdp_t$ | 1 | | |
| $\Delta lnl_{1t}$ | -22.37434** (0.61116) [-36.6096] | 20.17664* (10.4196) [ 1.93642] | |
| Constant | 47.07931 | 0.015901 (0.03663) [ 0.43414] | 0.106438** (0.04528) [ 2.35046] |

The test is performed with Eviews 5.1.
Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 10.6.1 presents the coefficient of the variable stock of labour (-22.37) which is negative and statistically significant at 5 percent level. This implies that an increase in stock of labour force will be increased economic growth by 22.37 percent in the long run. The short run coefficient of ($\Delta lnl_{1t}$) is positive and statistically significant at both 0.01 and 0.05 levels. This implies that 1 percent increase in labour force; economic growth (GDP) will be decreased by 20.18 percent in the short run. Since, the coefficient of ECT is positive and statistically significant, it can be said that causation goes from stock of labour force to GDP growth in Bangladesh. That is, there is short run dynamic adjustment to the long run divergence between GDP and stock of labour in Bangladesh.

**Table 10.6.2: Result of VECM for GDP and Domestic Investment (*Δlngdp, Δlndi*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lngdp_t$ | 1 | | |
| $\Delta lndi_{1t}$ | -0.105035<br>(0.09010)<br>[-1.16573] | -0.205531<br>(0.22846)<br>[-0.89962] | |
| Constant | -0.052117 | -0.000845<br>(0.01859)<br>[-0.04547] | -0.942112*<br>(0.31813)<br>[-2.96141] |

The test is performed with Eviews 5.1.
Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 10.6.2 presents the coefficient of variable domestic investment (-0.105) which is negative but statistically insignificant. Such magnitude implies that an increase in domestic investment will not significantly change economic growth in the long run. The short run coefficient of ($\Delta lndi_{1t}$) is also negative and statistically insignificant. Since, the coefficient of ECT is negative and statistically significant. It can be said that causation goes from domestic investment to GDP growth in Bangladesh. That is, there is short run dynamic adjustment to the long run equilibrium by 94 percent between domestic investment and GDP growth in Bangladesh.

**Table 10.6.3: Result of VECM for GDP Growth and FDI (*Δlngdp, Δlnfdi*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lngdp_t$ | 1 | | |
| $\Delta lnfdi_{1t}$ | -0.011564**<br>(0.00370)<br>[-3.12854] | -0.481834**<br>(0.15814)<br>[-3.04683] | |
| Constant | -0.060403 | -0.355540<br>(0.92569)<br>[-0.38408] | 39.94346*<br>(12.1917)<br>[ 3.27629] |

The test is performed with Eviews 5.1.
Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 10.6.3 finds the coefficient of variable FDI (-0.012) which is negative but statistically significant at both 1 and 5 percent level. Such magnitude implies that an increase in foreign direct investment will increase economic growth (GDP) significantly in the long run. This result is supported by (Hye, 2011; and Adhikary, 2012) while contradicted with (Shafiun et al., 2009). The short run coefficient of ($\Delta lnfdi_{1t}$) is also negative and statistically significant at both 1 and 5 percent levels. This also implies that 1 percent increase in FDI inflows in Bangladesh; economic growth (GDP) will be increased by 48 percent in the short run. Since, the coefficient of ECT is positive and significant, it can be said that causation goes from GDP growth to FDI in Bangladesh. That is, there exists a long run causality but with a divergence between FDI and GDP growth in Bangladesh.

**Table 10.6.4: Result of VECM for GDP and Trade Openness (*Δlngdp, Δlnto*)**

| Cointegrating Equation | Long-run | Short-run | Adjustment Coefficient of VECM |
|---|---|---|---|
| $\Delta lngdp_t$ | 1 | | |
| $\Delta lnto_{1t}$ | -0.655588**<br>(0.09298)<br>[-7.05073] | -0.202615<br>(0.12966)<br>[-1.56263] | |
| Constant | -0.040981 | -0.001278<br>(0.01918)<br>[-0.06663] | 0.964763**<br>(0.20178)<br>[ 4.78130] |

The test is performed with Eviews 5.1.
Figures in parentheses are the values of t-statistic and ** denotes the rejection of the hypothesis at 1 percent significance level and * denotes rejection of the hypothesis at 5 percent significance level.

Table 10.6.4 shows that the coefficient of variable ($\Delta lnto_{1t}$) is -0.66 which is negative and statistically significant at both 1 and 5 percent levels. This implies that an increase in the degree of trade openness will increase economic growth (GDP) in Bangladesh by 66 percent in the long run. The short-run coefficient of ($\Delta lnl_{1t}$) is also negative but statistically insignificant. This result is supported by Adhikary (2012). This implies that an increase in trade openness; economic growth (GDP) will not be changed significantly in the short run. The result is supported by (Shafiun et al., 2009). Since, the coefficient of ECT is positive and statistically significant at both 1 and 5 percent levels, it can be said that causation goes from trade openness to GDP growth in Bangladesh. That is, there exists a long run causality but with a divergence between trade openness and GDP growth in Bangladesh.

Thus, the long run relationships exist between GDP growth with stock of labour, FDI inflows and trade openness in 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.

### 10.7 Result of the VAR Model for GDP Growth Function

Theory states that the coefficients of the cointegrating equation with log value are known as the long run elasticity of the function. The first order lagged differenced value on the other hand, is known as the short run elasticity of the function. The long and short run elasticities of the GDP growth function are given by the following Table:

**Table 10.7.1: Long and Short-run Elasticity of Growth Function with VAR Model**

| Elasticity | Constant | Δlnl | Δlndi | Δlnfdi | Δlnto |
|---|---|---|---|---|---|
| Long-run | 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-run | 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 10.7.1 indicates the long run elasticity of the GDP growth *($\Delta lngdp_t$)* 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 stock of labour force may increase the GDP growth by 24.91 percent while 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. Therefore, the long run significant elasticity exists between labour and domestic investment to economic growth in Bangladesh. The short run elasticities (positive or negative) exist between labour force and FDI towards GDP growth in Bangladesh.

### 10.8 Result of the Granger Causality Test

Ganger causality is estimated using different lags. If F-statistic is significant, the null hypothesis that can be rejected, otherwise accepted. The results are presented by the Table 10.9.1.

Table 10.8.1 shows the pair-wise Granger causality of the function. Result 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. That is, both the stock of labour and GDP growth in Bangladesh cause each other to grow at the same tandem.

**Table 10.8.1: Results of Pair-wise Granger Causality Test of 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.

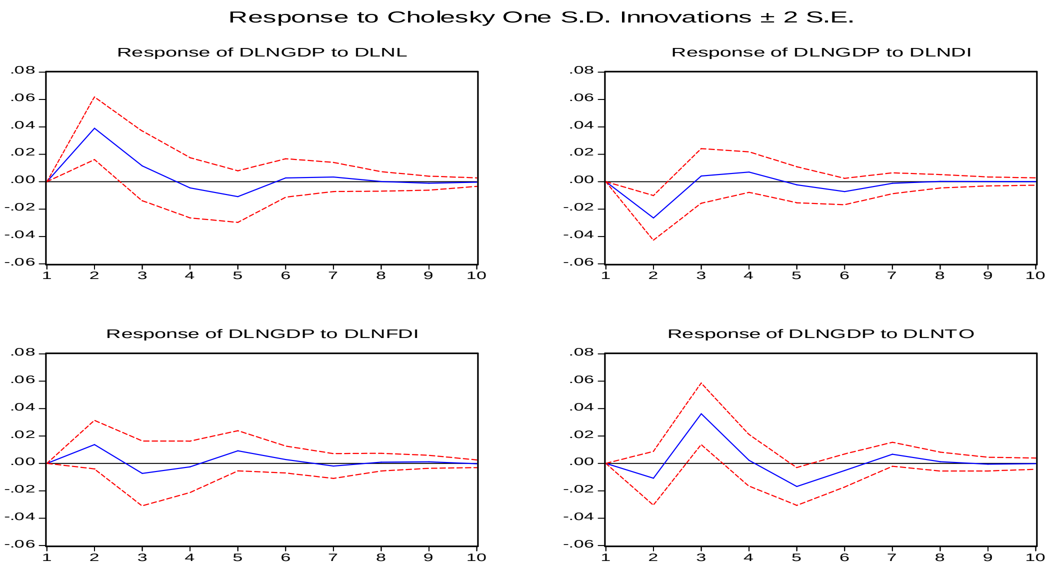
Table again shows that domestic investment is also statistically significant at 5 percent level of significance so that the null hypotheses of no causation are rejected and the alternative hypothesis is accepted. The null hypothesis of GDP does not Granger cause domestic investment indicated in the second 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 (Qamrullah, 2007; and 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).

Thus, there are bidirectional causalities between stock of labour and GDP as well as trade openness and GDP growth in Bangladesh. That is, they cause each other to grow at the same direction. Otherwise, there is unidirectional causality existed between the pair-wise residual variables with GDP growth in Bangladesh. That is, domestic investment causes GDP in Bangladesh 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.

### 10.9 Result of Impulse Response Analysis of the Variables in the VAR Model

The impulse response in the GDP growth to the stock of labour *(Δlnl)*, the domestic investment *(Δlndi)*, the foreign direct investment *(Δlnfdi)* and the trade openness *(Δlnto)* in Bangladesh context for the post-independent era have been explained in this study. It shows how a one-time positive shock of one standard deviation (± 2 S. E. innovations) to the stock of labour, domestic investment, foreign direct investment and trade openness endures on the economic growth (GDP) in Bangladesh.

**Figure 10.9.1: 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 10.9.1(a) presents the response of GDP to stock of labour force indicated by the figure 10.9.1(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. Figure 10.9.1(b) presents a mixed effect of domestic investment on economic growth of Bangladesh that it was only favourable in the third to fifth periods, but negative in all other periods. Thus, this has a bad implication on the performances of Bangladesh economy. Yet, reducing gap domestic investment is going to converge with GDP of Bangladesh. Likewise, foreign direct investment had only the positive implication in the second and fifth periods; otherwise, it has a steady negative effect on economic growth in Bangladesh. But, the bad implication decreases henceforth and both are converging each other in the long run. The trade openness in figure 10.9.1(d) has the positive implications in third and seventh periods otherwise it affects GDP of Bangladesh negatively. The effect decreases gradually and both the variables are converging each other over the periods. 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.

## 10.10 Variance Decompositions of the Variables of the GDP Growth Function

**Table 10.10.1: Variance Decomposition Results of the GDP with VAR Model**

| Period | S.E. | DLNGDP | DLNL | DLNDI | DLNFDI | DLNTO |
|---|---|---|---|---|---|---|
| 1 | 0.075 | 100.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.11 | 67.36 | 17.78 | 14.14 | 0.36 | 0.36 |
| 3 | 0.12 | 58.83 | 19.16 | 17.59 | 1.39 | 3.03 |
| 4 | 0.13 | 60.33 | 17.82 | 17.16 | 1.81 | 2.88 |
| 5 | 0.14 | 62.61 | 17.10 | 15.79 | 1.78 | 2.73 |
| 6 | 0.14 | 62.96 | 18.08 | 14.68 | 1.89 | 2.39 |
| 7 | 0.15 | 62.08 | 18.47 | 15.15 | 1.90 | 2.39 |
| 8 | 0.16 | 61.80 | 18.24 | 15.78 | 1.96 | 2.21 |
| 9 | 0.17 | 61.82 | 18.16 | 15.79 | 2.16 | 2.06 |
| 10 | 0.18 | 62.22 | 18.24 | 15.35 | 2.24 | 1.96 |
| Cholesky Ordering: DLNGDP DLNL DLNDI DLNFDI DLNTO | | | | | | |

Results are drawn with the software Eviews 5.1.

Note: Variance Decompositions of FDI functions are drawn with the first differenced data of Table 10.1.1

The variance decomposition outputs are reported in Table 10.10.1. It 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 of Bangladesh. On the other hand, the share of GDP growth in explaining the variance decomposition decreases gradually from the second year up to the tenth year. Summarily, the changes in GDP are mainly caused by its own variation which by the end of the tenth year it could accounted for 62.22% less (i.e. 62%). The volatility of GDP growth is mainly caused by its own variation, as it always accounts for major portion (above 62%) of the fluctuations.

## 10.11 Results of the Model Diagnostics

### 10.11.1 Results of Lagrange Multiplier (L-M) and Brusch-Godfrey (B-G) Tests

Table 10.11.1 indicates the results of the autocorrelation of the GDP growth equation. In case of equation (10.5.1), both the probability values are greater than ($\alpha$= 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 10.11.1: Results of Autocorrelation and Normality Tests of Growth Function**

| Tests | LM Test Statistics | Probability | Conclusions |
|---|---|---|---|
| F-statistic | 2.886772 | 0.098183 | No Autocorrelation |
| Obs*R-squared | 3.123984 | 0.077148 | Normally Distributed |

Source: Results are drawn from the equation (10.5.1) and the tests are performed with software Eviews 5.1.

### 10.11.2 Result of the White General Heteroscedasticity Test

**Table 10.11.2: Result of the White General Heteroscedasticity Test**

| Tests | WH Test Statistics | Probability | Conclusion |
|---|---|---|---|
| F-statistic | 14.98310 | 0.000000 | No Heteroscedasticity |
| Obs*R-squared | 32.36074 | 0.000080 | Normally Distributed |

Source: Results are drawn from the equation (10.5.1). The tests are performed with software Eviews 5.1.

Table 10.11.2 indicates that in case of the estimated GDP growth function (10.6.1), both the probability values are less than the critical value 0.05 and 0.01. 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 (10.6.1) is free from heteroscedasticity problem. The Breusch–Pagan-Godfrey test also reveals homoscedasticity (Obs*R-square 32.36 with associated P-value 0.00008which 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.

### 10.11.3 Results of the Stability Tests of the Models

The CUSUM and CUSUMSQ tests have been applied for checking the structural problem of the time series data of the estimated regression equation (10.6.1). The results of these tests are as follows:

Figure 10.11.3.1 shows 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. The result of CUSUM test in figure (10.11.3.1) shows that the statistic stays within the 95 percent confidence interval. That is, there is no structural break of the model over the period.

**Figure 10.11.3.1: Result of the CUSUM Test**

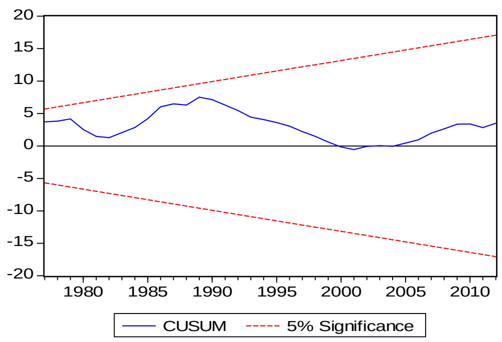
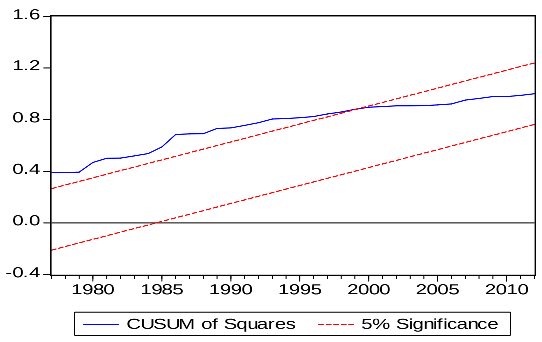



**Figure 10.11.3.2: Result of CUSUMSQ Test**




Note: Figures are drawn with Eviews 5.1

Figure 10.11.3.2 on the other hand, indicates that 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. So, the parameters could be used for policy purposes study safely.

## 10.12 Conclusion

The main objective of this study is 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 nature and trend of the GDP growth function shows that all the associated factors have the upward slopes but no one has a satisfactory trend over the periods. The structural break point and the stability of the function have been examined first with the Chow and Coppock Instability Index that shows no structural break point in 1990 as well as the instability index is higher in pre-liberalization than the post-liberalization periods in Bangladesh. The Jarque Bera and the correlation matrix show that the data series are normally distributed and the variables in the growth functions 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 level. But, they all have been freed from the unit problem at the first difference. Therefore, they are all integrated of order one *I(1)*. The cointegration test results indicate 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 GDP of Bangladesh is obviously influenced by all of its factors either positive or negative. The stock of labor positive but insignificantly affects GDP by 8.21 percent while domestic investment has a significantly positive effect on the GDP growth of Bangladesh by 70 percent. 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 however 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. On the other hand, there is a short run dynamics to the long run equilibrium for domestic investment and otherwise short run dynamics but a divergence relation exist among stock of labour, FDI and trade openness to economic growth in Bangladesh. 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. That is, they cause each other to grow at the same direction. Otherwise, there is unidirectional causality between the pair-wise residual variables of GDP growth function. That is, domestic investment causes GDP to grow but GDP does not play the same role for domestic investment. FDI on the other hand, does not significantly cause GDP to grow but GDP causes FDI to inflow in Bangladesh in the short run. The Impulse Response Analysis (IRA) confirms that 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 outputs are 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 is decomposed into its own variance by stock of labour, domestic investment, FDI, and trade openness while the share of GDP growth in explaining the variance decomposition decreases gradually from the second year up to the tenth year. Finally, the post estimation model diagnostic tests ensure the robustness of the results and the stability of the model of this study.

# Chapter Eleven: Summary, Recommendations and Conclusion

## 11.1 Summary of the Findings

The study contributes to the existing domestic investment, FDI, trade openness, economic growth and finance literatures of the concerned economies. This study disaggregatedly estimates the domestic investment, FDI and trade openness functions at the disaggregated level for Bangladesh so that the impacts of these factors and the causal relationships with them could be measured to meet up the objectives of this study. It further investigates the effect of domestic investment, FDI and trade openness on economic growth which is rarely studied in the context of Bangladesh. The disaggregated influences of different components of these core variables on them as well as their interrelationships have also critically been analyzed. Thus, this chapter basically discusses the key findings of the econometric estimation of the domestic investment, FDI, trade openness and GDP growth function. The results are also partially supported by the earlier studies but majorly contradict with them. So far to the researcher knowledge, the validity of using Solow, Romer endogenous growth model as well as Aggregate Production Function model has not yet been established in the existing literature. Again, the relationship between stock of labour, domestic investment, FDI inflows and trade openness with economic growth in Bangladesh has rarely been found in the existing empirical works. This chapter also summarizes the present scenarios of the issue and the findings of the corresponding objectives of the studies. Finally, it prescribes some policy suggestions so that these could help the government of Bangladesh as well as the concern authorities in this regard.

### Objective-i: Assessment of the Current States of the Issues in Bangladesh

The present scenario of this study indicates that most of the factors of GDP growth e.g. labour, domestic investment, FDI, trade openness etc. are unfavorable for economic growth in Bangladesh. In the disaggregated level, many of factors are also unfavourable for domestic investment, FDI and trade openness in Bangladesh. Evidence shows that the inward FDI to the developing countries has also the evidence as a major stimulus to the economic growth. Trade openness also has a positive effect on economic growth, exports, imports, FDI and remittance of developing countries like Bangladesh. Bangladesh has been able to achieve GDP growth at more than 6 percent on an average in recent years even of the global financial crisis in 2007-08. According to the final estimate of Bangladesh Bureau of Statistics, GDP growth rate stood at 6.71 percent in FY 2010-11 which was higher than

6.07 percent growth rate in FY 2010-11. The economy recorded 6.31 percent GDP growth rate in the fiscal year 2011-12 as per the provisional estimate. In FY 2011-12 at constant prices, share of agriculture, industry and service sectors stood at 19.29 percent, 31.26 percent and 49.45 percent respectively. There is a fluctuated trend of GDP growth rate in Bangladesh in recent years. The share of agriculture in Bangladesh is decreasing while the share of industry and service sectors to GDP is increasing over the years. The growth of savings rate in Bangladesh is very negligible for domestic investment demand. The gross domestic investment rose to 28.69 percent of GDP in 2013 from 24.65 percent in 2005. There is a positive sign in this case but a very remarkable negative gap between saving-investment is shown in Bangladesh and the gap is going to increase with the span of time. The gap is also clearly observed between the public-private saving-investments in Bangladesh. Thus, a huge investment would need to require resource mobilization by increased public savings through higher revenue earnings and increased private savings by both individuals as well as the corporate sector. There is also a clear gap between targeted and achieved investment in Bangladesh. That means, there is clear investment shortfall in Bangladesh and this shortfall is increasing gradually. Since, domestic saving in Bangladesh is insufficient to meet the needs of increased investment demand; the country needs larger doses of foreign direct investment (FDI) to meet the resource shortfall.

Bangladesh is well positioned as a favourable foreign investment destination because of its large and growing local market. Bangladesh in fact offers the most generous of incentives in the South Asian region for foreign investment under its liberalized investment regime shaped by industrial policy and export-oriented, private sector-led growth strategy. The foreign direct investment, net inflows (% of GDP) in Bangladesh was 0.71 as of 2011. Its highest value over the past 39 years was 1.35 percent in 2005, while its lowest value was -0.05 in 1979. After then FDI inflow is rising continuously and stands to 1.00 percent in 2013 while it was 1.11 in 2012 in Bangladesh. Thus the FDI inflow in Bangladesh has a positive trend over the period but not satisfactory at all compared to other countries of South Asia. The sector wise FDI inflows in Bangladesh in 2013, is that the textile and weaving sector are the major destination of FDI inflows in Bangladesh and it shares 26% of inflows in 2013. Agriculture and Fishing is the lowest destination and it occupies only 2% of the foreign investment in Bangladesh. Telecom and Banking sectors are also another two attractive sectors for FDI inflows in Bangladesh and share are 20% and 21% respectively in the same year.

Bangladesh in fact, opened her economy in the late 1980s to reap the benefits of FDI in order to accelerate economic growth. The government also lifted restrictions on capital and profit repatriation gradually and opened up almost all industrial sectors for foreigners to invest either independently or jointly with the local partners. FDI is thus, very much crucial for economic development of a country. But, it continues to be a matter of some disappointment that foreign investors still prefer other countries in the South Asian region, Pakistan and Sri Lanka for instance, over Bangladesh as their investment destination. Likewise, the gross capital formation as a percentage of GDP increased consistently but FDI inflow as a percentage of GDP provides a heterogenic trend. It mainly increased from 1995 (0.24%), but dropped in 1999 (0.69%), reached a peak in 2005 (1.46%) and leveled off 1.39% in 2008 and 1% in 2013. Similarly, with respect to GDP growth rates, the country exhibits a heterogenic trend that varies between 2.15% to 6.62% over the period 1986-2013. Domestic investment and trade openness also have the unsatisfactory and heterogenic trends in Bangladesh over the periods. This creates an interest for the researcher to investigate the impact and empirically examine the short and long run causal relationships among domestic investment, FDI, trade openness and GDP growth at the disaggregated level in Bangladesh with a view to assisting policy making institutions.

**Objective-ii: Influences of the Components of Domestic Investment and Causalities**

One of the important objectives of this study is to assess the degree of influences of the components of domestic investment on it and to examine their short and long run causal relationships associated with them at the disaggregated level in Bangladesh. In doing so, the domestic investment function (GDP, FDI, financial intermediation, real export, human capital, and domestic credit availability considered independent variables) has been estimated. Before estimation, the study finds that each of the variables has the upward trend over the periods but the slopes of them are different. The trend is very slow with some fluctuations. After 1990, domestic investment rises steadily in Bangladesh. The variable FDI has also a positive but fluctuated slope for Bangladesh but the rising pattern is not satisfactory at all. Almost same results have been found for other variables. In order to meet the objectives and to test the corresponding hypotheses the Chow test and the Coppock Instability index have been applied first. As the pre-estimating technique, these tests show that there is no structural break point of the data series in 1990 while the CII shows that instability of the data series is greater in the pre-liberalization than the post-liberalization periods in Bangladesh. The Jerque-Bera and the standard descriptive statistics show that the data of the function are normally distributed. The correlation matrix ensures that the variables of the function are positively correlated with domestic investment in Bangladesh. FDI inflow is also positively related with domestic investment but theory does not support it. This may be due to the insignificant contribution to the domestic economy.

In econometric analysis, the results of unit root tests (the correlogram, the ADF, the D-F (GLS), and the Phillips-Perron tests) show that the data of the variables of domestic investment function have been found non-stationary at their level form as the null hypotheses are insignificant. But, they have all been found stationary at the first difference because, the null hypotheses of stationariy of data have been significant then. That is, the variables have been integrated of order one ***I(1)***. The Johansen's Maximum Likelihood (ML) cointegration results show that there are 2 (two) long run stable cointegrating relationships between the pair-wise variables of domestic investment function. The OLS estimated coefficients of the domestic function indicate that domestic investment of Bangladesh is obviously influenced by its different components. The regression result shows that the GDP growth rate, FDI, real export and domestic credit have the positive impact on the domestic investment in Bangladesh of which real export affects domestic investment significantly. On the other hand, financial intermediation and human capital have negative impact on domestic investment but they are insignificant. The Wald test also confirms that the coefficients are jointly insignificant but some of them may be individually significant for the domestic investment in Bangladesh.

The VECM results show that the long run causalities exist between GDP growth rate, financial intermediation, real exports, human capital and domestic credit to the domestic investment in Bangladesh. Of which FDI, financial intermediation and domestic credit availability are negatively and others are positively related in the long run. The short run effects exist between domestic investment and financial intermediation. As the VECM term is significant, there is short run dynamics to the long run equilibrium among GDP growth rate, real export, human capital to domestic investment otherwise, a divergence relation exist among the residual variables to the domestic investment in Bangladesh. The VAR estimation results indicate that the long run positive elasticities exist between real exports, domestic credit availability to domestic investment while long run negative elasticities exist between financial intermediation and human capital to domestic investment in Bangladesh. The short run positive and significant elasticities exist between GDP growth rate, FDI and financial intermediations to domestic investment while the short run negative elasticities exist between real exports and human capital to domestic investment in Bangladesh. Results of Granger causality test show that there are bidirectional causalities between real export and domestic investment as well as domestic credit and domestic investment in Bangladesh that means they cause each other to grow. Otherwise, there is unidirectional causality between the residual pair-wise variables of the domestic investment function in Bangladesh. The result of impulse response analysis shows that the response of FDI to domestic investment reveals that it was only favourable in the first and fourth period but negative in all other periods. Thus, this has a bad implication on the performances of Bangladesh economy. Similarly, 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 domestic investment in Bangladesh. The variance decomposition shows that the changes in domestic investment are mainly caused by its own variation. By the end of the tenth year it could be accounted for below average value (i.e. 60%). The volatility of domestic investment is mainly caused by its own variation, as it always accounts for major portion (above 50%) of the fluctuations. Finally, the robustness of the results has been justified with the popular model diagnostic tests.

**Objective-iii: Influences of Different Components of FDI on It and Their Causalities**

Another important objective of this study is to assess the influences of the different components of FDI and to examine the short and long run causal relationships associated with them at the disaggregated level. In this context, the FDI function is consisted with GDP (dependent variable), GDP growth rate, gross capital formation, trade openness, stock of labour and the wage rate (independent variables) of Bangladesh. Before estimating the function, this study tries to show the trend and pattern of the independent variables of the function. The trends of FDI and other independent variables have upward and increasing pattern but the trends are very slow with some fluctuations. For the pre-estimation techniques, the Chow test results confirm that there exists a structural breakpoint in 1990 in the series of FDI during the study period. The result of Coppock Instability Index indicates that the instability in FDI is higher during Pre-liberalization than Post-liberalization period. The Jerque-Bera test and the standard descriptive statistics ensure that the data series of the FDI function are normally distributed. The correlation matrix confirms that all independent variables are positively correlated with FDI. The gross capital formation and wage rate are theoretically negative but they are also positively related due to the insignificant contribution to the FDI in Bangladesh.

In avoiding the spurious results, the unit root problem of data of FDI function has been verified first by applying correlogram test, ADF test, D-F (GLS) test, and Phillips-Perron test. Results show that the data series of the function suffer with unit root problem and the have been found non-stationary at the level. But, after first difference of the data they all have been found stationary as the unit root problem has been vanished then with significant null hypotheses. The Johansen's Maximum Likelihood (ML) results indicate that there are 2 (two) long run cointegrating stable relationships between pair-wise FDI and its various components in Bangladesh and they are converging each other in the long-run. The OLS estimated coefficients show that GDP growth rate and the wage rate have positive and significant impact on FDI while GDP, stock of labour and trade openness have insignificant negative impact on FDI. But the gross capital formation has significantly negative impact on FDI in Bangladesh. The Wald test confirms that the coefficients are jointly significant in the long run.

The VECM results indicate that the long run relationships exist between GDP growth rate, trade openness, and stock of labour to FDI in Bangladesh while the short run relationships exist between GDP, GDP growth rate, and gross capital formation to FDI. The ECM term is significant for GDP, gross capital formation, trade openness and stock of labour in Bangladesh that means there is short term equilibrium with long term dynamics between gross capital formations, stock of labour to FDI while a divergence relation exist among GDP and trade openness to FDI in Bangladesh. The VAR result shows that the long run significant elasticity exists between gross capital formation and the foreign direct investment in Bangladesh. This implies that GDP and gross capital formation are significant and positively elastic while the stock of labour and the wage rate in Bangladesh are negatively elastic with FDI in the short run. Results of Granger Causality test show that GDP growth rate and FDI cause each other to grow as the null hypotheses of no causations are rejected for both cases. Otherwise, there is unidirectional causality among the residual variables of the FDI function. That is, GDP causes FDI to inflow but FDI does not; gross capital formation causes FDI but FDI does not do so; trade openness causes FDI to grow but FDI does not cause trade openness; labour does not cause FDI to grow but FDI causes labour force to grow. Again, the wage rate of Bangladesh does not Granger cause FDI to grow but FDI causes wage rate to grow in the short run.

The impulse response analysis presents the response of FDI towards independent variables which reveals that many of them were unfavourble in the short run but they all are favourble in the long run. Therefore, the response of dependent variable to all of the independent variables is either positive or negative in the short run but in the long run they are responded towards the FDI in Bangladesh. The variance decomposition outputs of FDI function for Bangladesh is documented that the variance of it is always caused by 100 per cent by itself in the first year. But the share of FDI in explaining the variance decomposition decreases gradually. The volatility of FDI is very much high and it accounts majorly 80% and above. Finally, the robustness of the results is verified by the model diagnostic tests and the results are also partially supported by the earlier studies.

**Objective-iv: Influences of the Factors of Trade Openness and Their Causalities**

One of the objectives of this study is to assess the influences of the different components on trade openness index in Bangladesh as well as to examine the causal relationships associated with them at the disaggregated level. In order to meet this objective and to test corresponding hypothesis, this section tries to estimate the trade openness function by ordinary least squares (OLS) method. Before estimating the function, the trends of the variables show that there is a fresh upward rising trend of GDP over the period in Bangladesh. The real export has steadily increasing trend with very slow upward slope. The growth rate of real import is very much upward rising up to 1995 and then remains a stable rising pattern. The corresponding terms of trade is obviously upward rising over the periods while the real exchange rate is freshly increased continuously. The inflation rate in Bangladesh has been increasing from 2002 to the date. The degree of trade openness in Bangladesh is however not satisfactory and it remains almost same over the period.

As the pre-estimation technique, the Chow test confirms that there exists no structural breakpoint in 1990 in the series of trade openness during the study period while the Coppock Instability Index indicates that the instability in trade openness is higher during Pre-liberalization than Post-liberalization periods. The results of the correlation matrix show that trade openness is positively correlated with GDP, real exports, real imports, terms of trade, real exchange rate and real inflation but the real inflation rate is negatively correlated with trade openness in Bangladesh. That is, trade openness is seriously affected by the domestic inflation rate. The Jarque-Bera test statistics confirms the normality of the data series while the Sum and Sum Sq. Dev. ensures that there is no structural break of the data in 1990. For econometric analysis, the unit root problem has been justified first with the correlogram test, ADF test, D-F (GLS) test and the Phillips-Perron test. Results find that the data of the variables of the trade openness function are non-stationary at their levels but they all are stationary at the first difference. This means that they all are integrated of order one *I(1)*. The results of Johansen's Maximum Likelihood (ML) technique show that there are 2 (two) cointegrated long run stable relationships between trade openness and its various pair-wise components.

The OLS estimated coefficients of the trade openness function indicate that trade openness in Bangladesh is definitely influenced by its various factors. Of them, the terms of trade and real inflation have negative effects on trade openness but the effect of terms of trade is significant. GDP, real export, real import, and real exchange rate have positive effects on trade openness in Bangladesh but the effect of real export is significant. The Wald test confirms that the coefficients are jointly significant for trade openness in Bangladesh. The VECM results show that the long run relationships however exist between real export, real import, terms of trade and real inflation to trade openness in Bangladesh. The short run relationships exist between GDP and real exchange rate in Bangladesh. There is short run dynamics to the long run equilibrium among real import, terms of trade to trade openness as the ECM term is significant while there is short run dynamics but with a divergence relation among real export, real exchange rate and real inflation to trade openness in Bangladesh. The VAR results show that the elasticity of the real export factor is significant at both 5 and 1 percent level of significance. Again, the elasticity of terms of trade is also significant but negative in the long run. The coefficient of real imports is negatively responded whereas, the coefficient of real exchange rate positively elastic in the short run. Granger Causality test result shows that trade openness causes GDP to grow but GDP does not lead trade openness in Bangladesh. Results further show that both trade openness and real exports in Bangladesh cause each other to grow as the null hypotheses are rejected in both cases. Real import does not cause trade openness to grow but trade openness causes real imports to grow in Bangladesh. Again, the terms of trade causes trade openness to grow but trade openness does not cause terms of trade. The real exchange rate does not Granger cause trade openness but trade openness Granger causes real exchange rate to grow. The real inflation Granger causes trade openness in Bangladesh but very negligible while trade openness does not cause real inflation to grow. That is, there are bidirectional causality between trade openness and real export otherwise, unidirectional causality exist between residual pair-wise variables to the trade openness in Bangladesh.

The impulse response analysis of the trade openness function reveals that GDP was always favourable or at least has a non negative effect on trade openness over the periods.

Likewise, other variables have also positive or negative impact on trade openness in the short run but in the long run they all are responded towards the trade openness in Bangladesh. The variance decomposition outputs show that the variance of trade openness is always caused by 100 percent by itself in the first year. In the second year, the trade openness variance is decomposed into its own variance followed by GDP, real export, real import, terms of trade, real exchange rate and real inflation but the share of trade openness in explaining the variance decomposition decreases gradually. The volatility of trade openness is mainly caused by its own variation, as it always accounts for major portion (above 64%) of the fluctuations. The results of trade openness function have been diagnosed by some post estimation tests that have made the results more robust, reliable and consistent.

**Objective-v: Impact of Labour, DI, FDI, TO on GDP Growth and Their Causalities**

The main objective of this study is to assess the effect of stock of labour, domestic investment, FDI and trade openness on GDP growth in Bangladesh. It further aims to critically examine the short and long run causal relationships associated with them. To meet up this objective a complete econometric procedure has been carried out thoroughly. The trends and nature of the independent variables of GDP growth function indicate that the variables have positive and increasing trends over the period with little fluctuations. FDI has also the upward trend but it falls drastically in 1979, 1984 and 1985 otherwise, its pace remains upward rising with little fluctuations. For the pre-estimation measures, the Chow test confirms that there is no structural breakpoint in 1990, in the series of GDP during the study period. The Coppock Instability Index indicates that the instability in GDP growth series is higher during Pre-liberalization than Post-liberalization periods in Bangladesh. The results of the descriptive statistics indicate that the variables under study have been found normally distributed. The Jarque-Bera test statistics confirms the normality of data in the first difference while the Sum and Sum Sq. Dev. ensures that there is no structural break of the data. The results of correlation matrix show that GDP of Bangladesh is positively related with all of the independent variables in the function. It is also consistent with the theory of the issue.

For econometric analysis of the GDP growth function the unit root problem of data has been tested first in avoiding the spurious results. In this context, the correlogram test, the ADF test, the D-F (GLS) test, and the Phillips-Perron test have been applied. Results show that the unit root problems exist in their levels. That means, the data of the variables are non-stationary at levels but the problem has been vanished after the first difference, and the data have been stationary for the integration of order one *I(1)*. The results of Johansen's Maximum Likelihood (ML) technique show that there are 2 (two) cointegrated long run stable relationships between the GDP growth and it's pair-wise various components (stock of labour, domestic investment, FDI and trade openness). The OLS estimated coefficients of the growth function indicate that GDP of Bangladesh is definitely influenced by stock of labour, domestic investment, FDI and trade openness. The stock of labour positively affects GDP growth but it is insignificant. Domestic investment positively and significantly affects economic growth of Bangladesh by 70 percent. GDP of Bangladesh is again negatively affected by the FDI and trade openness but they are also insignificant. This is due to very little contribution of them to the domestic economy of Bangladesh. The Wald test confirms that the coefficients are jointly significant in the long run.

The results of VECM show that the estimated coefficient of stock of labour is negative but statistically significant at 5 percent level that an increase in stock of labour force will increase economic growth significantly in the long run. Thus, the long run relationships however exist among stock of labour, FDI and trade openness to GDP growth in Bangladesh while the short run relationships exist among stock of labour and foreign direct investment to the GDP in Bangladesh. There is short run dynamics to the long run equilibrium between domestic investment and GDP growth otherwise, short run dynamics but with a divergence relation exists among stock of labour, FDI and trade openness to GDP growth in Bangladesh. Results of VAR model show that the elasticities of stock of labour, domestic investment, FDI and the constant term are significant. The elasticity of FDI is also significant in the long run but negligible in this regard. The result further shows that the coefficients of the constant term, stock of labour force, and FDI are statistically significant in the short run. Therefore, the long run significant elasticities exist between labour (negative), and domestic investment (positive) with GDP in Bangladesh while the short run negative and significant elasticities exist among the stock of labour force and FDI to the economic growth in Bangladesh.

Result of Granger causality test shows that both stock of labour and GDP in Bangladesh cause each other to grow. In the same way, trade openness and GDP growth cause each other to grow in Bangladesh as the null hypotheses are significant. That is, there are bidirectional causalities between pair-wise labour and trade openness to GDP growth in Bangladesh. Otherwise, unidirectional causality exist between pair-wise domestic investment and FDI to GDP growth in Bangladesh. That is, domestic investment causes GDP to grow but GDP does not play the same role for 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. The impulse response analysis shows that the response of GDP to stock of labour reveals that it was favourable up to fourth period and negative effects are continued up to sixth period and it again goes to steady positive position and are converging each other over the period. Likewise, the response of all variables is either positive or negative in the short run but in the long run they all are positively responded towards the economic growth in Bangladesh. The variance decomposition outputs are documented that the variance of GDP growth is always caused by 100 per cent by itself in the first year. 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 by 15.35%, 2.24% and 1.96% respectively. The share of GDP growth in explaining the variance decomposition decreases gradually from the second year. The volatility of GDP growth is mainly caused by its own variation, as it always accounts for major portion (above 62%) of the fluctuations. The post estimation model diagnostic tests (LM test, B-G test, WGH test, CUSUM and CUSUMSQ test) have been applied that would make the results robust and reliable. These results are also partially supported by the earlier studies.

### 11.2 Implication of Empirical Results

The findings of the domestic investment Function (7.5.1) indicate that the coefficient of GDP growth rate is positive while the coefficient of FDI, real exports, and domestic credit are also positive for domestic investment in Bangladesh but the coefficient of real exports is significant at 0.01 levels. The coefficient of financial intermediation and human capital are negative to domestic investment but they are insignificant. Domestic investment of Bangladesh is however influenced by its factors but financial intermediation and human capital have significantly negative impact on it in Bangladesh. In contrast, GDP growth rate, FDI, real export and domestic credit have positive impact on the domestic investment in Bangladesh. The estimated coefficients of the FDI function (*8.5.1*) indicate that FDI inflows in Bangladesh are no doubt influenced by its different factors but gross capital formation significantly negatively affects FDI. GDP growth rate and wage rate again positively affect FDI in Bangladesh.  FDI in Bangladesh is negatively influenced by the GDP, stock of labour and trade openness but they are insignificant. The OLS estimated coefficients of the trade openness function (9.5.1) indicate that trade openness in Bangladeshis influenced by its various factors but terms of trade and real inflation significantly negatively affect trade openness while the effect of terms of trade is more severe. Trade openness is again positively affected by GDP, real export, real import and real exchange rate of Bangladesh. The degree of trade openness is adversely related to economic growth. That is, the low ratio of trade openness may hamper the economic growth in Bangladesh. The estimated coefficients of the growth function (10.6.1) 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.

### 11.3 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. The extent of government deficit should also be reduced rationally;

ii) Policies should be adopted to enhance productivity of human capital by implementing education, training, technological know how and other factors of human capital.

iii) Wage rate in Bangladesh should be rationalized so that labourer can have a minimum guarantee of maintaining their livelihoods. The government should adopt such policies so that they increase wage rate as well as attract more foreign investors here.

iv) Individual and national savings should be increased for domestic capital formation that may reduce the dependency on FDI in Bangladesh;

v) Govt. should further pursue the effort for domestic capital formation by strengthening public and private saving mobilization;

vi) The financial institutions of Bangladesh should be efficient and professional for the easy access to finance and credit availability for domestic investors. The existed loan disbursing policies of banks and other financial institutions should be easy and simple.

vii) The interest rate of banks and other financial institutions should be rationally reduced and labeled;

viii) The volatility of the stock market should be minimized, stabled and efficiently regulated;

ix) Incentives including one stop service system regarding FDI inflows should be ensured. Diplomatic motivation to the foreign entrepreneurs should also be enhanced;

x) Investment friendly atmosphere with good governance (political, economic and infrastructure) should be ensured. Moreover, the rules and regulations of Board of Investment and the Privatization Commission should be updated and the authorities should be efficient and unbiased;

xi) The govt. should implement appropriate policies to ensure macroeconomic stability with increasing GDP in a sustained manner, foster growth promoting and growth accommodating policies;

xii) Efforts should be continued to increase the value of exports so that it could reduce the saving-investment gap in Bangladesh. Export-led strategies should be geared up so that terms of trade can be positive for economic growth and incentives in this regard should be offered;

xiii) Export restrictions to other countries should be overcome by mutual understanding;

xiv) Trade integrated liberalization policies should be adopted for increasing the degree of trade openness that may attract foreign investors to the country;

xv) The law of business and investment in Bangladesh should be modernized with the international practices and requirements of globalization.

xvi) New export processing zones (EPZ) are to set up in the country in order to extend the facilities to export oriented investors. A consistent incentive fiscal package (rationalization of para tariffs, elimination of non-tariff barriers) should be implemented for attracting foreign investment;

xvii) 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;

xviii) Emphasis should be given more on producing import substitute goods instead of importing goods from abroad;

xix) Sector-wise economic liberalization should be ensured so that it can lead to higher openness and economic growth;

xx) Inflation rate in Bangladesh should be checked andpulled down to the single digit for more trade openness;

xxi) The exchange rate of Bangladesh should be stable and less volatile so that foreigners can easily import the Bangladeshi goods; and

xxii) An appropriate trade policy that would neither influence higher import costs nor create an adverse effect on exports is necessary for Bangladesh so that trade openness could maintain a channel between investment and economic growth.

Besides, Bangladesh can learn a valuable lesson from India and China where, an important source of FDI has been their expatriate nationals. The numbers for India are also impressive, but not nearly as large as for China because the Indian policymakers until 2002 were not welcoming of their expatriate citizen. The lesson for Bangladeshi policymakers is to welcome the non-resident Bangladeshi (NRB) citizens, especially those who are interested in investment and business. 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.

## 11.4 Conclusion

The study aims to assess the current states of domestic investment, FDI, trade openness and economic growth in Bangladesh. The study further attempts to examine the short and long run causal relationships among domestic investment, FDI, trade openness and economic growth. It finally, tries to assess the influences of the different components of domestic investment, FDI and trade openness on them and to examine the short and long run causal relationships associated with them at the disaggregated level in Bangladesh. In order to meet these objectives a complete disaggregated econometric analysis has been carried out in this study. The tabular and graphical techniques have also been used to assess the current states of the variables. They indicate that the variables of the core function (domestic investment, FDI, trade openness and growth) have the upward trends over the periods but they are instable in Bangladesh specially FDI. The variables in the disaggregated level are also suffering with the instability problem. In every case, the instability index is higher during pre-liberalization than the post-liberalization (1990) during the study period (1972-2013). The theoretical frames with model specifications of the issue (Solow, Romer Endogenous and APF models) and the variables of the respective functions with evidence in the literature have also been discussed in this study.

In econometric analysis, the time series properties of the data of domestic investment, FDI, trade openness and GDP growth functions have been justified successively. In this context, the unit root tests such as, the correlogram test, the ADF test, the D-F (GLS) and the Phillips-Perron tests have been applied in the study. For each of the functions, the tests provide the same results that is, the null hypotheses of unit root problem have been accepted at the level form but they have been rejected at the first difference. Hence, the data of the variables of the domestic investment, FDI, trade openness and growth functions for Bangladesh have been non-stationary at the level form but they all have been found stationary at the first difference because the unit root problem has been vanished then. Thus the variables of the functions have been integrated of order one *I(1)*. Results of the cointegration test (the trace and max-eigen value test of Johansen ML) confirm that there are 2 (two) long run cointegrated stable relationships between domestic investment and its various components, FDI and its different factors, trade openness and its major components as well as stock of labour, domestic investment, FDI, trade openness and economic growth in Bangladesh. They all are converging each other in the same direction.

In order to assess the impact of the components of different functions, OLS method has been applied for estimations. Results indicate that domestic investment of Bangladesh is influenced by its different components of which financial intermediation and human capital have the significantly negative effects. GDP growth rate, FDI, real export and domestic credit on the other hand, have the positive impact on domestic investment in Bangladesh. The coefficients of the FDI function indicate that FDI in Bangladesh is definitely influenced by its various components but gross capital formation significantly and negatively affects it. In contrast, GDP growth rate and wage rate positively affect FDI by 0.3 and 1.9 percent respectively. Again, FDI in Bangladesh is negatively influenced by the GDP, stock of labour and trade openness but they are insignificant. Results further shows that trade openness in Bangladesh is positively influenced by its different components (GDP, real export, real import and real exchange rate) but the terms of trade and real inflation significantly and negatively affect it. Finally, the estimated OLS coefficients of the growth function indicate that GDP of Bangladesh is definitely influenced by its different components of which the stock of labor and domestic investment affect GDP positively. The effect of labour to GDP is insignificant but domestic investment affect GDP in Bangladesh significantly by 70%. GDP of Bangladesh is negatively influenced by FDI and trade openness but they are insignificant. The Wald test confirms that the coefficients of GDP growth, FDI and trade openness functions are jointly significant but some of coefficients may be individually significant for domestic investment in Bangladesh.

For domestic investment, the VECM result shows the long run causalities exist among financial intermediation, real exports and the domestic investment in Bangladesh. The short run effects exist among GDP growth rate, real exports and domestic investment in Bangladesh. There are the short run dynamics to the long run equilibrium between GDP growth rates, real exports human capital, and domestic investment while there is long run causality but with a divergence between FDI, financial intermediation, domestic credit availability and domestic investment in Bangladesh. Result further shows that the long run relationships exist between GDP, GDP growth rate, trade openness and stock of labour to FDI in Bangladesh. Again, the short run relationships exist between GDP growth rates, gross capital formation. There is short run dynamics with long term equilibrium among GDP, gross capital formation, stock of labour and the wage rate to FDI in Bangladesh while there is long run causality but with a divergence among GDP, trade openness and FDI. The VECM result further shows that the long run relationships exist among real export, real import, terms of trade and real inflation to trade openness. Again, the short run relationships exist among GDP, real exchange rate and trade openness. On the other hand, there is short run dynamics to the long term equilibrium among GDP, real import, terms of trade and trade openness in Bangladesh while there is long run causality but with a divergence among real export, real exchange rate, real inflation and trade openness. The VECM results of growth function show that the long run relationships exist among stock of labour, FDI, trade openness and GDP growth in Bangladesh while short run relationships exist among stock of labour, FDI and GDP growth in Bangladesh. Results further show that there is short run dynamics to the long term equilibrium between domestic investment and

GDP growth while there is long run causality but with a divergence among stock of labour, FDI, trade openness and GDP growth in Bangladesh.

The VAR estimation shows the elasticities of the functions that is, the coefficients of real exports and domestic credit availability are significant for domestic investment in Bangladesh but the elasticities of financial intermediation and human capital are negative but statistically insignificant in the long run while others are positive but insignificant. The short term positive elasticities of GDP growth rate, FDI and financial intermediations are statistically significant while the elasticities of real exports and human capital are negative to domestic investment function in Bangladesh. The long run significant elasticities exist between gross capital formation and the foreign direct investment in Bangladesh. The short run significant elasticities exist among GDP, gross capital formation, stock of labour and wage rate in Bangladesh to FDI in the function, they may either be positive or negative. Again, the long run significant elasticities exist among real export, terms of trade and trade openness in Bangladesh while the short run significant elasticities exist among real imports, real exchange rate and trade openness in Bangladesh they may either be positive or negative. The VAR result finally shows that the long run significant positive elasticities exist among stock of labour and domestic investment to GDP growth. The short run significant but negative elasticies exist among stock of labour and FDI to GDP growth in Bangladesh while others are insignificant. The Granger causality test indicates that there are bidirectional causalities between domestic investment and real export as well as domestic investment and domestic credit availability in Bangladesh; otherwise there are unidirectional causalities between the pair-wise residual variables of the domestic investment function in the short run. In case of FDI function, there are bidirectional causalities between FDI and GDP growth rate that is, they cause each other to grow at the same direction in the short run; otherwise, there is unidirectional causality between the pair-wise residual variables of the FDI function in Bangladesh. On the other hand, there are bidirectional causalities between trade openness and real exports in Bangladesh. Otherwise, unidirectional causality exists between the pair-wise residual variables in the trade openness function. Results of Granger Causality test further show that stock of labour Granger causes GDP to grow at the same time GDP of Bangladesh also Granger causes stock of labour to grow at the same tandem. Similarly, both trade openness and GDP Granger cause each other to grow. Thus, bidirectional short run causalities exist between labour and trade openness to GDP while unidirectional causality exists between domestic investment and FDI to GDP growth in Bangladesh. That is, Domestic investment Granger causes GDP to grow but GDP of Bangladesh does not lead domestic investment. FDI on the other hand, does not Granger cause GDP to grow but GDP causes FDI to inflow.

Results of Impulse Response Analysis of domestic investment function indicate that 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 domestic investment in Bangladesh. It further confirms that the response of all variables of the FDI function is either positive or negative in the short run but in the long run they are responded towards the foreign direct investment in Bangladesh. In case of trade openness function, the diversification of responses of GDP, real exchange rate as well as real inflation to openness is very high in the short run but they all have been responded towards the same direction in the long run. The Impulse Response Analysis finally confirms that the Diversification of responses of stock of labour, domestic investment, FDI, as well as trade openness is very high in the short run but they all have been responded towards the same direction in the long run for GDP growth function. The variance decomposition outputs indicate that the changes in domestic investment are mainly caused by its own variation. The volatility of domestic investment is mainly caused by its own variation, as it always accounts for major portion (above 50%) of the fluctuations. The variance of foreign direct investment is always caused by 100 percent by itself and the share of FDI is subsequently decreases over the years while the volatility of FDI is mainly caused by its own variation and it accounts majorly above 80%. The variance of trade openness is always caused by 100 percent by itself in the first year and decreases gradually in the subsequent years. Again, the GDP is decomposed into its own variance by stock of labour, domestic investment, FDI, and trade openness while the share of GDP in explaining the variance decomposition decreases gradually. Finally, the model diagnostics confirm the model stability and they have made the findings consistent, robust and valid.

Bangladesh’s economy witnessed a somewhat positive growth in 2014, but still far from the robustness required to become a middle-income country by 2021. Infrastructure bottlenecks, erratic power supply to industrial units, low rate of revenue collection, sluggish investment, poor performance in external sector and lack of investment-friendly atmosphere, combined with the political uncertainty resulted in the country failing to achieve the expected growth (Independent, 28 Dec. 2014). However, the expansion of domestic output is only possible through more investment in the country; hence more savings is required in this regard. The government should design appropriate macroeconomic policies that would promote the expansion of public and private savings and help the transmission of these savings into productive investment and improving the overall efficiency. Avoiding continuous budget deficits, the government should focus on meeting its targets for collections of tax revenue and should avoid continuous borrowing from banks for reducing saving-investment gap. Thus, the expansion of exports, the development level of financial sector and human capital as well as domestic credit availability may stimulate domestic investment in Bangladesh. In the similar way, the success of using FDI in the country and catching up the benefits, the following conditions should be met as: i) availability of foreign capital should not detract from own saving effort; ii) FDI must be concentrated in the tradable sector, especially in export oriented industries; iii) prevent foreigners gaining control of the nation's strategically important assets, the growth of domestic investment should exceed FDI growth; iv) use of modern and latest technologies for foreign investment in the country should be ensured; and v) in avoiding dependency on foreign capital, Bangladesh should increase its savings rate and maintain sound economic and political atmosphere. Finally, trade openness tends to create an adverse impact on exports. Hence, the government should manage an appropriate trade policy that would neither influence higher import costs nor create an adverse effect on exports which is necessary for Bangladesh. Thus, for sustainable and attainable targeted economic growth in Bangladesh the government and the concern authorities should maintain the prescribed domestic investment, foreign direct investment as well as trade openness policies strictly. As a result, they could maintain a significant channel for sustainable economic growth in Bangladesh.

### 11.5 Need for Further Study

The research findings of this study definitely help the policy makers' and the concern authorities. Yet, there may have a scope of further research in this field. The influences of different components of domestic investment, FDI and trade openness on these core variables as well as their short and long run causalities have been assessed disaggregately in this study. Besides, the growth function has been estimated for examining the impacts of labour, domestic investment, FDI and trade openness on economic growth in Bangladesh. The variables in the growth function could be elaborated that is, the important variables like country's political instability, corruption, and natural disasters could be included in the study. These variables are often non-systematic for econometric study. But, they could be analyzed with another econometric models and techniques like Probit and Tobit models. For non-systematic impact on economic growth and the unavailability of long run data, the impacts of these variables have not been assessed separately in this study. These would be an area of further research.

# Appendix

## Table 4.3.2.1: Trends of Import and Export Growth Rate of World Trade

| | Real | | Estimated | |
|---|---|---|---|---|
| | 2012 | 2013 | 2014 | 2015 |
| World Trade (Commodity & Services) | 2.8 | 3.0 | 4.3 | 5.3 |
| Imports | | | | |
| Developed Economies | 1.1 | 1.4 | 3.5 | 4.5 |
| Developing and Rising Economies | 5.8 | 5.6 | 5.2 | 6.3 |
| Exports | | | | |
| Developed Economies | 2.1 | 2.3 | 4.2 | 4.8 |
| Developing and Rising Economies | 4.2 | 4.4 | 5.0 | 6.2 |

Sources: Bangladesh Economic Review, 2014 (World Economic Outlook, April 2014 & IMF)

## Table 4.3.3.1: Export from Bangladesh to SAARC Member Countries (in million US$)

| Country | 2003-04 | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 |
|---|---|---|---|---|---|---|---|---|---|
| Afghanistan | 6.07 | 0.51 | 0.88 | 0.75 | 2.77 | 3.68 | 2.74 | 3.53 | 3.59 |
| Bhutan | 3.99 | 3.35 | 1.65 | 1.40 | 1.35 | 0.61 | 2.24 | 3.12 | 9.13 |
| India | 101.16 | 186.95 | 279.14 | 289.41 | 358.08 | 276.58 | 304.63 | 512.51 | 498.42 |
| Maldives | - | 0.48 | 0.26 | 0.27 | 0.08 | 0.14 | 0.74 | 0.93 | 1.78 |
| Nepal | 1.27 | 0.47 | 0.83 | 0.85 | 6.71 | 8.06 | 8.79 | 10.84 | 41.58 |
| Pakistan | 34.78 | 84.14 | 50.26 | 61.06 | 71.06 | 76.22 | 77.67 | 86.79 | 73.21 |
| Srilanka | 10.15 | 12.16 | 14.39 | 14.82 | 19.32 | 18.67 | 23.74 | 34.73 | 42.59 |
| Total | 157.42 | 288.06 | 347.41 | 368.56 | 459.32 | 383.96 | 420.55 | 452.45 | 670.30 |

Source: Export Promotion Bureau Provided by Bangladesh Economic Review 2012.

## Table 4.3.4.1: Country-wise Import Payments (in Million US $)

| Year | China | India | Singapore | Malaysia | Japan | South Korea | Hong Kong | Taiwan | USA | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2000-01 | 709 | 1184 | 824 | 148 | 846 | 411 | 478 | 412 | 248 | 4075 | 9335 |
| 2003-04 | 1198 | 1602 | 911 | 255 | 552 | 420 | 433 | 377 | 226 | 4929 | 10903 |
| 2004-05 | 1642 | 2030 | 888 | 276 | 559 | 426 | 565 | 439 | 329 | 5993 | 13147 |
| 2005-06 | 2079 | 1868 | 849 | 302 | 651 | 489 | 626 | 473 | 345 | 7064 | 14746 |
| 2008-09 | 3452 | 2868 | 1768 | 703 | 1015 | 864 | 851 | 498 | 461 | 10027 | 22507 |
| 2009-10 | 3819 | 3214 | 1550 | 1232 | 1046 | 839 | 788 | 542 | 469 | 10239 | 23738 |
| 2010-11 | 5918 | 4569 | 1294 | 1760 | 1308 | 1124 | 777 | 731 | 677 | 15500 | 33658 |
| 2011-12 | 6455 | 4755 | 1711 | 1407 | 1456 | 1551 | 704 | 793 | 710 | 15974 | 35516 |
| 2012-13 | 4777 | 6324 | 1422 | 1180 | 613 | 733 | 1296 | 538 | 1093 | 15298 | 34084 |
| 2013-14 | 2565 | 3569 | 1123 | 513 | 340 | 406 | 504 | 317 | 945 | 8465 | 18747 |
| Percent* | 13.7 | 19.0 | 6.0 | 2.7 | 1.8 | 2.2 | 1.7 | 2.7 | 5.0 | 45.2 | 100.0 |

Source: Bangladesh Economic Review 2012, 2014. * Up to December 2013.

## Table 4.3.4.2: Country-wise Export Earnings of Bangladeshi Goods (Million US$)

| Year | USA | Germ. | UK | France | Belgium | Italy | Netherl. | Canada | Japan | Others | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001 | 2500.42 | 789.88 | 598.18 | 365.99 | 253.91 | 295.73 | 327.96 | 125.66 | 107.58 | 1101.69 | 6467.00 |
| 2002 | 2218.79 | 681.44 | 647.96 | 413.69 | 211.39 | 262.31 | 283.36 | 109.85 | 96.13 | 1061.08 | 5986.00 |
| 2005 | 2412.05 | 1353.80 | 943.17 | 626.17 | 325.43 | 369.18 | 291.94 | 335.25 | 122.41 | 1875.12 | 8654.52 |
| 2007 | 3441.02 | 1955.38 | 1174.0 | 731.76 | 435.82 | 515.66 | 459.01 | 457.21 | 147.47 | 2860.58 | 12177.9 |
| 2008 | 3590.56 | 2174.81 | 1373.95 | 953.13 | 488.39 | 579.23 | 653.88 | 532.90 | 172.56 | 3591.31 | 14110.8 |
| 2010 | 3950.47 | 2187.35 | 1508.54 | 1025.9 | 390.54 | 623.92 | 1016.88 | 648.19 | 330.55 | 4522.33 | 16204.7 |
| 2012 | 5100.90 | 3689.00 | 2444.60 | 1380.4 | 742.00 | 977.40 | 691.30 | 993.70 | 600.50 | 7668.00 | 24287.7 |
| 2013 | 2790.86 | 2341.57 | 1369.33 | 827.05 | 474.98 | 616.13 | 233.15 | 543.87 | 445.41 | 5043.46 | 14685.81 |
| Percent | 19.00 | 15.94 | 9.32 | 5.63 | 3.23 | 4.20 | 1.59 | 3.70 | 3.03 | 34.34 | 100 |

Source: Bangladesh Export Promotion Bureau up to Dec. 2013 (Bangladesh Economic Review 2012, 2014).

**Table 4.3.5.1.1: Removal of Quantitative Restrictions at the 4-Digit HS Classification Level**

| F. Years | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1997 | 2003-06 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Restricted for trade reasons | 478 | 550 | 529 | 433 | 315 | 239 | 193 | 93 | 109 | 114 | 120 | 122 | 63 |
| Restricted for non-trade reasons | 275 | 252 | 257 | 165 | 135 | 93 | 78 | 13 | 7 | 5 | 5 | 5 | 5 |
| Banned | 138 | 151 | 133 | 89 | 66 | 47 | 34 | 12 | 19 | 6 | 6 | 6 | 8 |
| Restricted | 16 | 86 | 79 | 101 | 52 | 39 | 25 | 14 | 14 | 12 | 16 | 16 | 10 |
| Mixed | 49 | 61 | 60 | 78 | 62 | 60 | 56 | 54 | 69 | 92 | 93 | 95 | 40 |

Sources: Compiled from Yilmaz and Varma, 1995; Bayes and others, 1995; Taslim, 2004.
Note: Figures for 2003-2006 are derived from Import Policy Orders 2003-06.

**Table 4.3.5.2.1: Tariff Structure in Bangladesh from FY 2000-01 to 2013-14**

| Fiscal year | Operative Tariff (%) | Maximum Tariff Rate (%) | Number of Operative Tariff Slabs |
|---|---|---|---|
| 2000-01 | 0, 5, 15, 25, 37.5 | 37.5 | 5 |
| 2001-02 | 0, 5, 15, 25, 37.5 | 37.5 | 5 |
| 2002-03 | 0, 7.5, 15, 22.5, 32.5 | 32.5 | 5 |
| 2003-04 | 0, 7.5, 15, 22.5, 30 | 30 | 5 |
| 2004-05 | 0, 7.5, 15, 25 | 25 | 5 |
| 2005-06 | 0, 7.5, 15, 25 | 25 | 5 |
| 2006-07 | 0, 5, 12, 15 | 25 | 5 |
| 2007-08 | 0,10,15, 25 | 25 | 5 |
| 2008-09 | 0, 3, 7, 12,15 | 25 | 5 |
| 2009-10 | 0, 3, 5, 12, 25 | 25 | 5 |
| 2010-11 | 0, 3, 5, 12, 25 | 25 | 5 |
| 2011-12 | 0, 3,5, 12, 25 | 25 | 5 |
| 2012-13 | 0, 3, 5, 12, 25 | 25 | 5 |
| 2013-14 | 0, 2.5, 10, 25 | 25 | 5 |

Source: Bangladesh Economic Review, 2014 (National Board of Revenue of Bangladesh).

**Table 4.3.5.3.1: Trend in the Import-weighted Average Tariff**

| Fiscal Year | Import-weighted tariff | Fiscal Year | Import-weighted tariff | Fiscal Year | Import-weighted tariff | Fiscal Year | Import-weighted tariff |
|---|---|---|---|---|---|---|---|
| 1990-91 | 42.1 | 1999-00 | 13.8 | 2003-04 | 11.48 | 2010-11 | 14.85 |
| 1991-92 | 24.1 | 2000-01 | 15.1 | 2004-05 | 16.53 | 2011-12 | 14.83 |
| 1994-95 | 20.9 | 2001-02 | 9.73 | 2005-06 | 16.39 | 2012-13 | 15.10 |
| 1998-99 | 14.7 | 2002-03 | 12.45 | 2007-08 | 17.2 | 2013-14 | 14.44 |

Sources: WTO, 2000; and Bangladesh Economic Review, 2014.

**Table 4.3.5.3.2: Average Custom Duties and Para-tariffs in Bangladesh** (World Bank, 2004)

| F. Year | | 1991 | 1992 | 1995 | 1996 | 1997 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| All tariff lines | Customs duties | 70.64 | 57.93 | 28.70 | 28.24 | 27.27 | 22.40 | 21.10 | 21.02 | 19.91 | 18.82 |
| | Para- tariffs | 2.98 | 2.59 | 3.26 | 3.38 | 5.88 | 6.99 | 7.43 | 8.41 | 6.51 | 10.2 |
| | Total protection rate | 73.62 | 60.52 | 31.96 | 31.61 | 33.15 | 29.39 | 28.54 | 29.43 | 26.42 | 29.11 |
| Industrial tariff lines | Customs duties | 69.72 | 57.34 | 28.40 | 27.79 | 26.80 | 21.86 | 20.39 | 20.28 | 19.08 | 18.02 |
| | Para- tariffs | 3.44 | 2.99 | 3.47 | 3.58 | 5.98 | 7.33 | 7.84 | 8.47 | 6.74 | 8.81 |
| | Total protection rate | 73.16 | 60.33 | 31.87 | 31.37 | 32.78 | 29.19 | 28.23 | 28.75 | 25.82 | 26.82 |
| Agriculture tariff lines | Customs duties | 76.64 | 61.83 | 30.07 | 30.25 | 29.42 | 24.87 | 24.53 | 24.60 | 23.85 | 22.56 |
| | Para- tariffs | -0.01 | -0.03 | 2.28 | 2.48 | 5.42 | 5.41 | 5.46 | 8.15 | 5.44 | 17.22 |
| | Total protection rate | 76.63 | 61.80 | 32.36 | 32.73 | 34.83 | 30.28 | 30.00 | 32.74 | 29.29 | 39.77 |

Source: Bangladesh Economic Review 2014.

**Table 4.3.5.4.1: Changes in Economic Indicators for Liberalization (In Million US$)**

| Fiscal Year | 1976-80 | 1981-85 | 1986-90 | 1991-95 | 1996-00 | 2001-05 | 2006-10 | 2011-12 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|
| GDP per capita | 154.2 | 196.8 | 230 | 271.8 | 324 | 354.6 | 504 | 880 | 1115 |
| GDP at constant price | 19,164 | 22,789 | 27,321 | 33,472 | 42,515 | 55,054 | 71,837 | 86,128 | 97,262 |
| GDP Growth Rate (%) | 4.4 | 4 | 4 | 4.4 | 5.2 | 5.2 | 6.2 | 6.52 | 6.12 |
| Total population (in million) | 85.6 | 97.8 | 110.8 | 123.2 | 135.8 | 148.2 | 150 | 152 | 156 |
| Investment | 1,747 | 3,040 | 4,264 | 5,686 | 9,155 | 13,615 | 20,089 | 29,823 | 38,752 |
| Inflation (% change in CPI) | ------ | 11.5 | 7 | 7.84 | 5.65 | 5.4 | 7.7 | 8.69 | 6.78 |
| Trade % of GDP | 18.4 | 16.4 | 18.4 | 22.6 | 31.4 | 36 | 45.2 | 47.42 | 46.30 |
| Total Export | 941.4 | 1,381 | 1,721 | 2,914 | 5,460 | 8,410 | 15,018 | 19,868 | 22,906 |
| Total Import | 2,191 | 3,321 | 3,845 | 4,783 | 8,166 | 10,383 | 17,435 | 23,661 | 26,468 |
| Remittances | 144.6 | 510 | 725 | 1,008 | 1,645 | 3,199 | 8,481 | 12 | 8,033 |
| Current Account Balance | -411.8 | -499 | -526.6 | -3.8 | -396.4 | -23.8 | 1319 | -1686 | 2525 |
| FDI inflow | 4.2 | 1 | 2.5 | 6 | 161 | 332 | 623 | 1185 | 1502 |
| Real Exchange Rate (%) | | 45 | 48 | 53 | 54 | 63 | 63 | 79.10 | 77.75 |
| Real Interest Rate (%) | 6.4 | 1 | 7 | 10.4 | 10 | 11 | 8.2 | 5.00 | 5.44 |

Source: WDI 2014 and BER, 2014.

**Table 4.3.5.4.2: A Snapshot of Bangladesh's Trade Regime in 2009**

| Policy Criteria | Status |
|---|---|
| Exchange Rate | Unified |
| Exchange Rate determination | Free Float |
| Payment convertibility | |
| Current account | Yes |
| Capital account | No |
| Import restrictions | |
| Import licensing | No |
| QRs on imports | No |
| State monopolies | No |
| Tariff structure | |
| Top Rate, 2009 | 25 |
| Average Protective Rate 2009 | 20.1 |
| Tariff slabs (customs duty) | 3, 7, 12, 25 |
| Para-tariffs | Supplementary Duties |
| Existence of high level of NTBs | No |
| Trade Openness (trade-GDP ratio) | 43 |

Source: Bangladesh Trade Policy 2009, Bangladesh Commerce Ministry.

**Table 4.3.6.1: Trend of Trade Openness with GDP Growth in Bangladesh (Million US$)**

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|
| GDP | 60277.6 | 64273.6 | 68810.4 | 72948.5 | 76628.8 | 80898.4 | 86128.0 | 91744.8 | 97262.0 |
| Actual Export | 9994.8 | 12575.6 | 14207.3 | 15213.3 | 15217.6 | 15360.9 | 19867.7 | 22357.5 | 22905.7 |
| Actual Import | 13891.4 | 16418.0 | 19042.6 | 18680.6 | 18194.9 | 18319.8 | 23660.6 | 26149.4 | 26467.9 |
| Trade Openness | 39.6 | 45.1 | 48.3 | 46.5 | 43.6 | 41.6 | 50.5 | 52.9 | 50.8 |
| Av. Exchange Rate | 61.39 | 67.08 | 69.03 | 68.60 | 68.80 | 69.18 | 71.17 | 79.09 | 77.74 |

Source: Own Estimation with Respect to Bangladesh Economic Review, 2012 and 2014.

**Table 4.3.6.2: Trade Openness in Bangladesh from 1972 to 2013** (Const. Pr. 2005 Million US$)

| Year | GDP | Exp. | Imp. | D. of TO* | Year | GDP | Exp. | Imp. | D. of TO* |
|---|---|---|---|---|---|---|---|---|---|
| 1972 | 15070.86 | 4073.03 | 6700.24 | 47.2 | 2004 | 56889.52 | 8645.94 | 11667.72 | 35.7 |
| 1975 | 16368.05 | 5988.06 | 1857.21 | 15 | 2005 | 60277.56 | 9994.81 | 13891.43 | 39.6 |
| 1980 | 20089.27 | 1017.87 | 3322.19 | 21.6 | 2006 | 64273.57 | 1257.56 | 16418.01 | 45.1 |
| 1985 | 24109.27 | 1453.63 | 3704.88 | 21.4 | 2007 | 68810.38 | 14207.33 | 19042.60 | 48.3 |
| 1990 | 28954.13 | 2078.76 | 5073.83 | 24.7 | 2008 | 72948.48 | 15213.29 | 18680.56 | 46.5 |
| 1993 | 32866.44 | 2856.95 | 5404.45 | 25.1 | 2009 | 76628.82 | 15217.63 | 18194.93 | 43.6 |
| 1995 | 35893.75 | 3872.10 | 7529.89 | 31.8 | 2010 | 80898.43 | 15360.91 | 18319.83 | 41.6 |
| 2000 | 46268.66 | 6403.56 | 9947.75 | 35.3 | 2011 | 86128.01 | 19867.66 | 23660.60 | 50.5 |
| 2001 | 48708.88 | 7358.22 | 11063.52 | 37.8 | 2012 | 91744.81 | 22357.53 | 26149.35 | 52.9 |
| 2003 | 53532.75 | 7682.77 | 10549.47 | 34.1 | 2013 | 97261.98 | 22905.71 | 26467.89 | 50.8 |

Source: World Development Indicators 2014. * Own Estimated Results of Trade Openness in Bangladesh.

**Table 5.1.1: Country-wise GDP Growth Scenario (Actual & Projected) in Percentages**

| Country/Region | Actual | | | Projections | | |
|---|---|---|---|---|---|---|
| | 2007 | 2008 | 2009 | 2010 | 2011 | 2015 |
| Bangladesh | 6.3 | 6.0 | 5.4 | 5.4 | 5.9 | 6.2 |
| Cambodia | 10.2 | 6.7 | -2.6 | 4.8 | 6.8 | 6.8 |
| India | 9.4 | 7.3 | 5.7 | 8.8 | 8.8 | 8.1 |
| Vietnam | 8.5 | 6.2 | 5.3 | 6.0 | 6.5 | 7.5 |
| Developing Asian Economies | 10.6 | 7.9 | 6.6 | 8.7 | 8.7 | 8.5 |
| Emerging and Developing Economies | 6.5 | 9.2 | 5.2 | 6.2 | 4.7 | 3.8 |
| Developed Economies | 0.2 | 0.5 | 0.4 | 0.4 | 0.3 | 0.1 |
| World | 5.2 | 3.0 | -0.6 | 4.2 | 4.3 | 4.6 |

Source: IMF, World Economic Outlook, 2010

**Table 5.1.3.1: Unemployment, Wage and Labour Participation Rate in South Asia** (Projected)

| Item | 2009 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|
| Labour Force Participation Rate | 57.8 | 56.1 | 56.1 | 56.2 | 56.2 | 56.3 | 56.3 | 56.3 | 56.3 |
| Unemployment Rate (Total) | 4.2 | 3.9 | 3.9 | 3.9 | 3.9 | 4.0 | 4.0 | 4.0 | 4.0 |
| Youth Unemployment Rate | 9.8 | 9.9 | 9.9 | 10.0 | 10.1 | 10.2 | 10.2 | 10.2 | 10.3 |
| Employment growth Rate | 0.7 | 1.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.7 | 1.7 |
| Y. Employment Growth Rate | -2.1 | -1.8 | 0.6 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.1 |
| Real Wage Growth Rate | 4.8 | 1.3 | 3.3 | 2.3 | 2.7 | 3.1 | 3.3 | 3.5 | 3.6 |
| Productivity | 6.8 | 3.8 | 3.2 | 3.6 | 4.2 | 4.4 | 4.6 | 4.8 | 4.8 |

Source: ILO, Trends Econometric Models, October 2014; ILO, Global Wage database, December 2014; ILO Research Department. Note: Regional wage and productivity growth includes estimates and projections for 5 out of 8 countries.

**Table 5.2.1.1: The Macroeconomic Performaces at Current Market Prices** (Base Year 2005-06)

| Item | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|
| GDP (in crore Tk.) | 482337 | 549800 | 628682 | 705072 | 797539 | 915829 | 1055204 | 1198923 | 1350920* |
| GNI (in crore Tk.) | 509544 | 585075 | 677072 | 760973 | 862142 | 988342 | 1144506 | 1295352 | 1440937 |
| Population (In crore) | 13.98 | 14.18 | 14.38 | 14.58 | 14.78 | 14.97 | 15.16 | 15.37 | 15.58 |
| Per Capita GDP (in Tk.) | 34502 | 38773 | 43719 | 48359 | 53961 | 61198 | 59614 | 78009 | 83731 |
| Per Capita GNI (in Tk.) | 36448 | 41261 | 47084 | 52193 | 58332 | 66044 | 75505 | 84283 | 92510 |
| Per Capita GDP (in US$) | 514 | 562 | 637 | 703 | 780 | 860 | 880 | 976 | 1115 |
| Per Capita GNI (in US$) | 543 | 598 | 686 | 759 | 843 | 928 | 955 | 1054 | 1190 |
| GDP Growth Rate | 6.67 | 7.06 | 6.01 | 5.05 | 5.57 | 6.46 | 6.52 | 6.01 | 6.12 |

Source: Bangladesh Economic Review 2014. * Estimated.

## Table 5.2.1.2: Structural Trend of Broad Sectoral Shares in GDP and Growth Rate

(at Constant Prices, Base Year: 1996-96)

| Sector | 1980-81 | 1985-86 | 1990-91 | 1995-96 | 2000-01 | 2005-06 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Agriculture | 33.07 | 31.15 | 29.23 | 25.68 | 25.03 | 21.84 | 20.29 | 20.01 | 19.29 | 16.78 | 16.34 |
| Industry | 17.31 | 19.13 | 21.04 | 24.87 | 26.20 | 29.03 | 29.93 | 30.38 | 31.26 | 29.00 | 29.61 |
| Services | 49.62 | 49.73 | 49.73 | 49.45 | 48.77 | 49.14 | 49.78 | 49.60 | 49.45 | 54.22 | 54.05 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.0 | 100 |
| Average Growth Rate (In Percent) | | | | | | | | | | | |
| Agriculture | 3.31 | 3.31 | 2.23 | 3.10 | 3.14 | 4.94 | 5.24 | 5.13 | 3.01 | 2.46 | 3.35 |
| Industry | 5.13 | 6.72 | 4.57 | 6.98 | 7.45 | 9.74 | 6.49 | 8.20 | 9.47 | 9.64 | 8.39 |
| Services | 3.55 | 4.10 | 3.28 | 3.96 | 5.53 | 6.40 | 6.47 | 6.22 | 6.06 | 5.51 | 5.83 |
| GDP (At Producer Prices) | 3.74 | 3.34 | 3.24 | 4.47 | 5.41 | 7.02 | 6.22 | 6.59 | 6.39 | 6.14 | 6.16 |

Source: Bangladesh Economic Review 2012, 2014.

## Table 5.2.1.3: Expenditure Based Gross Domestic Product (GDP) at Current Prices

Base Year 2005-06 (in Crore Tk.)

| Item | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|
| Domestic Demand [(2) +(3)] | 434014 | 494908 | 672771 | 746485 | 840898 | 978095 | 1129475 | 1275097 | 1421944 |
| **Consumption** | 331552 | 376317 | 508042 | 561714 | 631571 | 726966 | 831250 | 934727 | 1034430 |
| Public | 23032 | 26106 | 32555 | 35915 | 40478 | 46684 | 53175 | 61339 | 70209 |
| Private | 308520 | 350212 | 475487 | 525799 | 591093 | 680282 | 778075 | 873389 | 964221 |
| **Investment** | 102480 | 115590 | 134729 | 184772 | 209327 | 251129 | 298225 | 340370 | 387514 |
| Public | 24933 | 25729 | 28281 | 30437 | 37276 | 48150 | 60802 | 79621 | 98603 |
| Private | 77546 | 89862 | 136448 | 154334 | 172051 | 202979 | 237423 | 260749 | 288911 |
| **Net Export** | -26070 | -32723 | -45914 | -43803 | -45895 | -69390 | -82177 | -86570 | -73912 |
| **Gross Domestic Expenditure** | 407962 | 459185 | 626857 | 702682 | 795003 | 908705 | 1047299 | 1188527 | 1348032 |
| GDP | 415728 | 472477 | 628682 | 705072 | 797539 | 915829 | 1055204 | 1198923 | 1350920 |
| Statistical Discrepancy | 7766 | 13292 | 2226 | 2931 | 3083 | 8017 | 7905 | 10396 | 2888 |

Source: Bangladesh Economic Review 2012, 2014.

## Table 5.2.4.1: National Consumer Price Index and Inflation in Bangladesh

**(Base Year 2005-06 = 100)**

| | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|---|---|---|---|---|---|---|---|
| General Index | 109.39 | 122.84 | 132.17 | 141.18 | 156.59 | 170.19 | 181.73 |
| (Inflation) | (9.39) | (12.30) | (7.60) | (6.82) | (10.91) | (8.69) | (6.78) |
| Food Index | 111.63 | 130.30 | 140.61 | 149.40 | 170.48 | 183.65 | 193.24 |
| (Inflation) | (11.63) | (16.30) | (7.91) | (6.25) | (14.11) | (7.72) | (5.22) |
| Non-Food Index | 106.51 | 113.27 | 127.36 | 130.66 | 138.77 | 152.94 | 166.97 |
| (Inflation) | (6.51) | (6.35) | (7.14) | (7.66) | (6.21) | (10.21) | (9.17) |

Sources: BBS, Bangladesh Economic Review 2014.

## Table 5.2.4.2: Inflation Rate in Bangladesh over the Years (consumer prices annual %)

| Year | Inflation | Year | Inflation | Year | Inflation | Year | Inflation | Year | Inflation |
|---|---|---|---|---|---|---|---|---|---|
| 1984 | 8.25 | 1990 | 6.13 | 1996 | 2.38 | 2002 | 3.33 | 2008 | 8.90 |
| 1985 | 7.34 | 1991 | 6.36 | 1997 | 5.31 | 2003 | 5.67 | 2009 | 5.43 |
| 1986 | 9.32 | 1992 | 3.64 | 1998 | 8.40 | 2004 | 7.59 | 2010 | 8.13 |
| 1987 | 9.87 | 1993 | 3.02 | 1999 | 6.11 | 2005 | 7.05 | 2011 | 10.70 |
| 1988 | 7.42 | 1994 | 5.31 | 2000 | 2.21 | 2006 | 6.77 | 2012 | 6.22 |
| 1989 | 6.05 | 1995 | 10.30 | 2001 | 2.01 | 2007 | 9.11 | 2013 | 7.53 |

Source: World Development Indicators 2014.

### Table 5.2.5.1: Recent Trade Openness and Inflation in Bangladesh

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|
| Degree of Openness | 39.6 | 45.1 | 48.3 | 46.5 | 43.6 | 41.6 | 50.5 | 52.9 | 50.8 |
| Imports (million US$) | 3926.89 | 4019.72 | 4112.55 | 4205.38 | 4298.21 | 4391.04 | 4483.86 | 4576.7 | 4669.5 |
| Current Account Balance | -557 | 824 | 936 | 680 | 2416 | 3724 | 885 | 1630 | 2525 |
| Inflation, consumer prices (ann. %) | | 6.77 | 9.11 | 8.91 | 5.42 | 8.13 | 10.71 | 6.22 | 7.53 |
| Exchange Rate | 61.39 | 67.08 | 69.03 | 68.60 | 68.80 | 69.18 | 71.17 | 79.09 | 77.74 |

Source: World Development Indicator 2014 and Bangladesh Economic Review 2014

### Table 5.2.6.1: Share of Employed Labor Force by Broad Sectors

**(Age Group by 15 + as % Total)**

| Sectors | LFS 1995-96 | LFS 1999-00 | LFS 2002-03 | LFS 2005-06 | LFS 2010 |
|---|---|---|---|---|---|
| Agriculture, Forestry and Fishing | 48.85 | 50.77 | 51.69 | 48.10 | 47.50 |
| Mining and Quarrying | - | 0.51 | 0.23 | 0.21 | 0.18 |
| Manufacturing | 10.06 | 9.49 | 9.71 | 10.97 | 12.34 |
| Electricity, Gas & Water Supply | 0.29 | 0.26 | 0.23 | 0.21 | 0.18 |
| Construction | 2.87 | 2.82 | 3.39 | 3.16 | 4.79 |
| Commerce, Hotel & Restaurant | 17.24 | 15.64 | 15.34 | 16.45 | 15.53 |
| Transport, Storage & Communi. | 6.32 | 6.41 | 6.77 | 8.44 | 7.39 |
| Finance, Trade & Other Services | 0.57 | 1.03 | 0.68 | 1.48 | 1.85 |
| Commodity & Personal Services | 13.79 | 13.08 | 6.32 | 5.49 | 6.28 |
| Health, Education, Pub. Ad. & Defense | - | - | 5.64 | 5.49 | 4.25 |
| Total | 100 | 100 | 100 | 100 | 100 |

Sources: BBS, Bangladesh Labour Force Surveys, Bangladesh Economic Review 2014.

### Table 5.2.6.2: Employment in Agriculture and Non-agriculture in Bangladesh

**(in Crores)**

| Year | Labour Statistics | | Total Employment | |
|---|---|---|---|---|
| | Labour Force | Employed Population | Agriculture | Non-agriculture |
| 2003 | 4.63 | 4.43 | 2.29 | 2.24 |
| 2006 | 4.95 | 4.74 | 2.28 | 2.46 |
| 2010 | 5.67 | 5.41 | 2.55 | 2.85 |
| 2013 | 6.07 | 5.81 | 2.62 | 3.19 |

Source: BBC, March, 2015 (Report published by the Daily Star, March 2015)

### Table 5.2.6.3: Total Population and the Active Population

**(age group 15-64 years % of total)**

| Year | Total Population | Active Populaion | Year | Total Population | Active Populaion | Year | Total Population | Active Populaion |
|---|---|---|---|---|---|---|---|---|
| 1960 | 49537147 | 53.59 | 1992 | 112430968 | 54.96 | 2005 | 143135180 | 61.40 |
| 1965 | 57200412 | 52.39 | 1994 | 117369492 | 55.84 | 2006 | 144868702 | 61.87 |
| 1971 | 67627868 | 51.83 | 1995 | 119869585 | 56.32 | 2007 | 146457067 | 62.32 |
| 1972 | 68730070 | 51.84 | 1998 | 127478524 | 57.91 | 2008 | 147969967 | 62.78 |
| 1975 | 72265173 | 51.90 | 2000 | 132383265 | 58.97 | 2009 | 149503100 | 63.25 |
| 1978 | 78011624 | 51.91 | 2001 | 134729503 | 59.48 | 2010 | 151125475 | 63.73 |
| 1980 | 82498440 | 52.00 | 2002 | 137006279 | 59.97 | 2011 | 152862431 | 64.22 |
| 1985 | 94287722 | 52.80 | 2003 | 139185986 | 60.46 | 2012 | 154695368 | 64.71 |
| 1988 | 102133217 | 53.56 | | | | | | |
| 1990 | 107385847 | 54.20 | 2004 | 141235035 | 60.93 | 2013 | 156594962 | 65.22 |

Source: World Development Indicators 2014.

### Table 5.2.6.4: Labour Force, Female and Unemployment Rate in Bangladesh

(% of total labor force) (modeled ILO estimate)

| Year | Total Unemployment | Labor Force, Female | Labor Force, Total | Year | Total Unemployment | Labor Force, Female | Labor Force, Total |
|---|---|---|---|---|---|---|---|
| 1990 | | 38.68 | 47166967 | 2002 | 3.40 | 37.34 | 62105927 |
| 1991 | 3.60 | 38.85 | 48547230 | 2003 | 4.30 | 37.61 | 63618367 |
| 1992 | 3.30 | 38.60 | 49676575 | 2004 | 4.5 | 37.83 | 65081482 |
| 1993 | 3.20 | 38.45 | 50747638 | 2005 | 4.30 | 38.14 | 66488284 |
| 1994 | 3 | 38.24 | 51841505 | 2006 | 4.20 | 38.46 | 67828612 |
| 1995 | 2.90 | 37.96 | 53039589 | 2007 | 4.30 | 38.81 | 69111445 |
| 1996 | 2.5 | 37.72 | 54200733 | 2008 | 4.40 | 39.08 | 70372739 |
| 1997 | 2.90 | 37.54 | 55382337 | 2009 | 5 | 39.42 | 71661990 |
| 1998 | 2.5 | 37.31 | 56642189 | 2010 | 4.5 | 39.74 | 73014258 |
| 1999 | 3.10 | 37.13 | 57797247 | 2011 | 4.5 | 39.91 | 74546620 |
| 2000 | 3.30 | 36.89 | 58986696 | 2012 | 4.5 | 40.12 | 76038745 |
| 2001 | 3.40 | 37.15 | 60557892 | 2013 | 4.30 | 40.22 | 77609688 |

Source: World Development Indicators 2014.

### Table 5.2.7.1: Wage Rate Index in Bangladesh (Base Year 1969-70 = 100)

| Fiscal Year | Nominal Wage Rate Index | | | | | NCPI of Industrial Labour | Real Wage Rate Index (General) |
|---|---|---|---|---|---|---|---|
| | General | Agriculture | Fishery | Manufact. | Construction | | |
| 2004 | 3293<br>(5.85) | 2719<br>(5.30) | 2957<br>(6.55) | 4015<br>(6.64) | 2758<br>(3.33) | 2216<br>(4.08) | 149<br>(2.05) |
| 2005 | 3507<br>(6.50) | 2926<br>(7.61) | 3133<br>(5.95) | 4293<br>(6.92) | 2889<br>(4.75) | 2351<br>(6.09) | 149<br>(0.00) |
| 2006 | 3779<br>(7.76) | 3156<br>(7.86) | 3332<br>(6.35) | 4636<br>(7.99) | 3135<br>(8.52) | 2524<br>(7.36) | 150<br>(0.67) |
| 2007 | 4227<br>{11.85) | 3524<br>(11.66) | 3669<br>(10.11) | 5197<br>(12.10) | 3549<br>(13.20) | 2740<br>(8.56) | 154<br>(2.67) |
| 2008 | 5026<br>(18.90) | 4274<br>(21.28) | 4236<br>(15.45) | 6128<br>(17.91) | 4311<br>(21.47) | 2885<br>(5.30) | 174<br>(12.92) |
| 2009 | 5441<br>(8.26) | 4804<br>(12.37) | 4727<br>(9.07) | 6620<br>(6.40) | 4633<br>(8.70) | - | - |
| 2010 | 5782<br>(6.27) | 5326<br>(10.87) | 5043<br>(6.69) | 6778<br>(3.96) | 4983<br>(7.55) | - | - |
| 2011 | 6469<br>(11.89) | 6134<br>(15.17) | 5187<br>(2.85) | 7221<br>6.54) | 6583<br>(32.10) | - | - |
| 2012 | 7422<br>(14.73) | 7448<br>(2144) | 6021<br>(16.08) | 7978<br>(10.48) | 7684<br>(16.73) | - | - |

Sources: BBS of different years & Bangladesh Economic Review, 2014.
Note: Numbers in the parenthesis indicate the annual percentage changes.

### Table 5.2.8.1: Number of Overseas Labour and Their Remittances (in crore Tk.)

| Fiscal Year | Overseas Pop. (000) | Remittances | | | |
|---|---|---|---|---|---|
| | | Million US $ | Percent ** Change (%) | Crore Tk. | Percent ** Change (%) |
| 2002-03 | 251 | 3061.97 | 22.42 | 17719.58 | 23.14 |
| 2003-04 | 277 | 3371.97 | 10.12 | 19872.39 | 12.15 |
| 2004-05 | 250 | 3848.29 | 14.13 | 23646.97 | 18.99 |
| 2005-06 | 291 | 4801.88 | 24.78 | 32274.60 | 36.49 |
| 2006-07 | 564 | 5978.47 | 24.50 | 41298.50 | 27.96 |
| 2007-08 | 981 | 7914.78 | 32.39 | 54293.24 | 31.45 |
| 2008-09 | 650 | 9689.16 | 22.42 | 66674.87 | 22.80 |
| 2009-10 | 427 | 10987.40 | 13.40 | 76109.60 | 14.15 |
| 2010-11 | 439 | 11650.32 | 6.03 | 82992.89 | 9.04 |
| 2011-12 | 691 | 12843.43 | 10.24 | 101882.78 | 22.76 |
| 2012-13 | 441 | 14461.15 | 12.59 | 115646.16 | 13.51 |
| 2013-14 | 264 | 9206.12 | -6.93 | 71506.97 | -10.71 |

Source: Bangladesh Economic Review, 2014 (Ministry of Welfare and Overseas Employment)
Note: * (July 2013- February 2014). ** ( % Change in comparison with the same time period of the previous year)

### Table 5.2.9.1: Actual Scenarios of Human Development in Bangladesh

| | 1980 | 1990 | 2000 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|
| Human Development Index | 0.259 | 0.313 | 0.390 | 0.469 | - | 142 | 142 |
| Population below National Poverty Line (%) | - | 58.8 | 49.8 | 40.0 | 31.51 | - | - |
| Fertility Rate (birth per woman) | 5.0 | 4.3 | 3.0 | 2.277 | 2.24 | 2.208 | - |
| Infant Mortality Rate (per thousand people) | 101.4 | 94.0 | 66.3 | 43.0 | 36.8 | 34.9 | 33.2 |
| Life Expectancy at birth (years) | 56.9 | 56.0 | 60.6 | 66.9 | 69.49 | 69.89 | 70.29 |
| Gross Primary Enrollment Ratio (%) | 61.0 | 72.0 | 97.5 | 101.2 | 104.46 | 114.20 | - |
| Gross Secondary Enrollment Ratio (%) | 18.0 | 19.0 | 42.0 | 48.17 | 49.89 | 50.79 | 53.65 |
| Adult Literacy Rate (age 15 and older (%)) | 29.0 | 35.0 | 45.0 | 55.0 | - | - | 58.79 |

Source: UNDP, Human Development Report 2010; and WDI, 2014. * relates to 2008; ** relate to 2009.

### Table 5.2.10.1: Trends of Domestic Savings in Bangladesh from 1972 to 2013 ((% of GDP)

| Year | Gross Domestic Savings | Year | Gross Domestic Savings | Year | Gross Domestic Savings | Year | Gross Domestic Savings |
|---|---|---|---|---|---|---|---|
| 1972 | -3.36 | 1990 | 9.65 | 1998 | 16.68 | 2006 | 20.74 |
| 1975 | 0.94 | 1991 | 11.33 | 1999 | 16.73 | 2007 | 20.23 |
| 1980 | 2.05 | 1992 | 12.54 | 2000 | 17.78 | 2008 | 18.90 |
| 1984 | 6.24 | 1993 | 12.86 | 2001 | 16.97 | 2009 | 19.99 |
| 1985 | 8.64 | 1994 | 13.54 | 2002 | 18.38 | 2010 | 20.49 |
| 1986 | 9.83 | 1995 | 12.64 | 2003 | 17.58 | 2011 | 19.84 |
| 1987 | 9.07 | 1996 | 12.38 | 2004 | 18.67 | 2012 | 20.47 |
| 1988 | 9.24 | 1997 | 14.70 | 2005 | 18.06 | 2013 | 21.17 |

Source: World Development Indicator, 2014.

### Table 5.2.10.2: Sector-wise Saving Distribution in Bangladesh (As Percentage of GDP)

| Item | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|
| **Domestic Savings** | **20.25** | **20.35** | **20.31** | **20.09** | **20.10** | **19.29** | **19.37** | **22.04** | **23.43** |
| Public | 1.41 | 1.41 | 1.35 | 1.32 | 1.35 | 1.38 | 1.36 | - | - |
| Private | 18.84 | 18.94 | 18.96 | 18.77 | 18.75 | 17.91 | 18.01 | - | - |
| **National Savings** | **27.67** | **28.66** | **30.21** | **29.57** | **30.02** | **28.78** | **29.40** | **30.53** | **30.54** |

Source: Bangladesh Economic Reviews 2012 and 2014.

### Table 5.2.11.1: Domestic Gross Capital Formation (GCF) in Bangladesh (Million US$)

| Year | GCF | Year | GCF | Year | GCF | Year | GCF | Year | GCF |
|---|---|---|---|---|---|---|---|---|---|
| 1972 | 295.40 | 1982 | 3223.05 | 1990 | 5138.20 | 1998 | 9538.11 | 2006 | 18776.49 |
| 1975 | 1192.44 | 1983 | 2911.64 | 1991 | 5230.56 | 1999 | 10140.91 | 2007 | 20841.20 |
| 1976 | 9993.79 | 1984 | - | 1992 | 5487.23 | 2000 | 10850.03 | 2008 | 24009.47 |
| 1977 | 1109.97 | 1985 | 3526.88 | 1993 | 5952.34 | 2001 | 10848.09 | 2009 | 26855.39 |
| 1978 | 1535.65 | 1986 | 3534.05 | 1994 | 6214.30 | 2002 | 11011.53 | 2010 | 30256.90 |
| 1979 | 1746.23 | 1987 | - | 1995 | 7254.00 | 2003 | 12150.55 | 2011 | 35273.78 |
| 1980 | 2615.64 | 1988 | 4182.47 | 1996 | 8130.45 | 2004 | 13587.65 | 2012 | 37689.45 |
| 1981 | 3482.52 | 1989 | 4486.14 | 1997 | 8769.67 | 2005 | 14784.41 | 2013 | 42581.72 |

Source: World Development Indicator 2014.
Note: Data have been rounded at 2 digits after decimal.

**Table 5.3.1.1: Domestic / Local Investment in Bangladesh (Percentages of GDP)**

| Criteria | 1997 | 2000 | 2001 | 2002 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross Domestic Investment | 21.6 | 23.1 | 23.1 | 23.4 | 24.4 | 24.7 | 24.5 | 24.2 | 24.4 | 24.4 | 25.2 | 25.5 | 28.4 | 28.7 |
| Public Investment | 6.4 | 7.2 | 6.4 | 6.2 | 5.9 | 6.0 | 5.5 | 4.9 | 4.7 | 5.1 | 5.6 | 6.3 | 6.6 | 7.3 |
| Private Investment | 15.3 | 15.8 | 16.8 | 17.2 | 18.5 | 18.7 | 19.0 | 19.3 | 19.7 | 19.4 | 19.5 | 19.1 | 21.8 | 21.4 |
| National Savings | - | - | - | - | - | 27.8 | 28.7 | 30.2 | 29.6 | 30.0 | 28.8 | 29.4 | 30.5 | 30.5 |

Source: (Board of Investment of Bangladesh) Bangladesh Economic Reviews, 2012, 2014.

**Table 5.3.2.1: Private Investment Proposals Registered with BoI(In Million Tk.)**

| Fiscal Year | Local Investment Proposals Registered | | Foreign/ JV Investment Proposals Registered | | Total Investment Proposals Registered | | Growth in Project Value (%) |
|---|---|---|---|---|---|---|---|
| | projects | Project Value | Projects | Project Value | Projects | Project Value | |
| 2001-02 | 2875 | 88060 | 89 | 17340 | 2964 | 105400 | (-) 28.8 |
| 2002-03 | 2101 | 116526 | 104 | 20670 | 2205 | 137196 | (+) 30 |
| 2003-04 | 1624 | 135461 | 130 | 26440 | 1754 | 161901 | (+) 18 |
| 2004-05 | 1469 | 140046 | 120 | 52977 | 1589 | 193023 | (+) 19 |
| 2005-06 | 1754 | 183703 | 135 | 249857 | 1889 | 433560 | (+) 125 |
| 2006-07 | 1930 | 196581 | 191 | 119251 | 2121 | 315832 | (-) 27 |
| 2007-08 | 1615 | 193530 | 143 | 54328 | 1758 | 247859 | (-) 22 |
| 2008-09 | 1336 | 171174 | 132 | 147496 | 1468 | 318671 | (+) 27 |
| 2009-10 | 1470 | 274137 | 160 | 62608 | 1630 | 336743 | (+) 5 |
| 2010-11 | 1746 | 553690 | 196 | 365243 | 1942 | 918933 | (+) 173 |
| 2011-12 | 1735 | 534769 | 220 | 344163 | 1955 | 878932 | (-) 4 |
| 2012-13 | 1457 | 44615 | 219 | 22072 | 1676 | 66687 | (-) 24 |
| 2013-14 | 739 | 26814 | 83 | 17825 | 822 | 44638 | (-) 33.06 |

Source: Bangladesh Economic Review 2012 (Monthly Report (2011-12), Policy & Planning, BOI).

**Table 5.3.3.1: Saving and Investment Gap in Bangladesh (as percentage of GDP)**

| Fiscal Year | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|---|
| Gross Domestic Saving | 20.01 | 20.25 | 20.35 | 20.31 | 20.09 | 20.10 | 19.29 | 19.73 | 22.03 | 23.43 |
| Gross National Saving | 25.84 | 27.67 | 28.66 | 30.21 | 29.57 | 30.02 | 28.78 | 29.40 | 30.53 | 30.54 |
| Gross Investment | 24.53 | 24.65 | 24.46 | 24.21 | 24.37 | 24.41 | 25.15 | 25.45 | 28.39 | 28.69 |
| Public | 6.21 | 6.00 | 5.45 | 4.95 | 4.70 | 5.01 | 5.64 | 5.76 | 6.64 | 7.30 |
| Private | 18.32 | 18.65 | 19.02 | 19.25 | 19.67 | 19.40 | 19.51 | 19.14 | 21.75 | 21.39 |
| **Investment-Saving Gap** | **4.52** | **4.40** | **4.11** | **3.90** | **4.28** | **4.31** | **5.86** | **5.72** | **6.36** | **5.26** |

Source: Bangladesh Bureau of Statistics and Bangladesh Economic Review, 2012, 2014.

**Table 5.3.3.2: Investments Needed to Achieve the Targeted GDP Growth Rate (2009-10 to 2013-14)**

| Items | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | Total |
|---|---|---|---|---|---|---|
| Targeted GDP Growth (%) | 6.0 | 6.8 | 7.5 | 8.0 | 8.0 | - |
| Required Investment (US$ billion) | 24.59 | 30.63 | 37.18 | 43.82 | 49.69 | 185.91 |
| Investment as percent of GDP | 24.0 | 27.02 | 29.25 | 30.40 | 30.40 | - |
| MTMF-estimate of Available Investment (US$ billion) | 23.55 | 27.10 | 31.36 | 35.54 | 40.29 | 157.84 |
| Investment Shortfall (US$ billion) | 1.04 | 3.53 | 5.82 | 8.27 | 9.40 | 28.06 |
| Achieved Growth Rate | 6.07 | 6.71 | 6.32 | 6.01 | 6.12 | - |

Source: Bangladesh Economic Review, 2014.

**Table 5.4.2.1: Net Inflows of FDI in South Asian Countries (as % of GDP)**

| Year | Bangla desh | India | Phili pines | Pakistan | Vietnam | Year | Bangla desh | India | Phili pines | Pakistan | Vietnam |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 0.001 | - | 0.051 | 0.183 | - | 2000 | 0.595 | 0.752 | 2.764 | 0.416 | 3.858 |
| 1975 | 0.008 | -0.010 | 0.765 | 0.220 | - | 2001 | 0.167 | 1.108 | 0.256 | 0.530 | 3.684 |
| 1980 | 0.047 | 0.042 | -0.327 | 0.269 | - | 2003 | 0.517 | 0.699 | 0.585 | 0.641 | 3.394 |
| 1985 | -0.031 | 0.045 | 0.039 | 0.422 | -0.000 | 2005 | 1.262 | 0.871 | 1.614 | 2.010 | 3.390 |
| 1990 | 0.011 | 0.072 | 1.196 | 0.613 | 2.781 | 2007 | 0.817 | 2.036 | 1.954 | 3.668 | 8.655 |
| 1993 | 0.042 | 0.194 | 2.277 | 0.677 | 7.028 | 2009 | 0.804 | 2.606 | 1.226 | 1.392 | 7.169 |
| 1995 | 0.005 | 0.585 | 1.994 | 1.191 | 8.586 | 2011 | 0.921 | 1.941 | 0.895 | 0.613 | 5.482 |
| 1997 | 0.329 | 0.845 | 1.484 | 1.147 | 8.270 | 2013 | 1.001 | 1.500 | 1.347 | 0.563 | 5.193 |

Source: World Development Indicators, 2014.

**Table 5.4.2.2: Sources of the Joint Ventures and 100% Foreign Investment projects** (In Million US$)

| Countries | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|
| USA | 46.294 | 17.887 | 39.550 | 15.348 | 143.526 | 846.707 | 16.416 | 110.49 | 81.78 |
| Thailand | 2.744 | 3.996 | 0 | 54.908 | 3.043 | 97.523 | 1177.72 | 81.48 | 0.0 |
| India | 27.605 | 31.062 | 24.293 | 58.851 | 15.515 | 68.020 | 197.099 | 2120.64 | 157.22 |
| South Korea | 11.107 | 50.144 | 9.682 | 23.869 | 32.475 | 3277.742 | 2354.470 | 11.36 | 4.21 |
| Malaysia | 1.559 | 2.160 | 1.474 | 1.288 | 5.475 | 137.116 | 12.422 | 7.26 | 1.72 |
| Netherlands | 19.288 | 22.648 | 23.247 | 1085.455 | 9.064 | 113.352 | 67.977 | 3.62 | 0.34 |
| China | 15.733 | 8.768 | 22.167 | 19.031 | 27.180 | 73.090 | 49.279 | 164.73 | 1676.19 |
| U.K | 57.773 | 83.128 | 195.822 | 6.875 | 4.387 | 8.875 | 5.787 | 60.68 | 0.00 |
| Japan | 2.851 | 10.052 | 12.065 | 7.172 | 6.805 | 14.989 | 80.605 | 35.42 | 8.18 |
| Canada | 0.152 | 0.671 | 7.964 | 1.178 | 1.203 | 1.846 | 3.148 | 4.24 | 0.00 |
| Taiwan | 1.423 | 14.134 | 0.150 | 2.841 | 10.961 | 21.637 | 7.214 | 1.50 | 3.68 |
| Denmark | 14.060 | 6.702 | 0.462 | 4.285 | 1.200 | 0.687 | 3.910 | 3.96 | 1.06 |
| Singapore | 33.324 | 45.491 | 33.453 | 1.020 | 4.643 | 133.109 | 78.344 | 16.30 | 11.26 |
| Hongkong | 8.284 | 28.821 | 9.285 | 5.698 | 61.810 | 45.108 | 16.406 | 23.67 | 2.05 |
| KSA | 1236.121 | 1096.103 | 47.686 | 17.695 | 0 | 9.132 | 2.312 | 0.0 | 0.0 |
| France | 2.561 | 1.398 | 1.460 | 2.249 | 0 | 1.121 | 10.104 | 2.33 | 0.0 |

Source: Board of Investment of Bangladesh published by Bangladesh Economic Review, 2014.

**Table 5.4.2.3: Foreign Direct Investment Stocks and Inflows**

| Countries | FDI Inflows (Million US$) | | | FDI Stock Million US$) | | |
|---|---|---|---|---|---|---|
| | 1995-2005 (Annual Avg.) | 2008 | 2009 | 1995 | 2008 | 2009 |
| Bangladesh | 427 | 1086 | 716 | 600 | 4816 | 5139 |
| India | 4137 | 40148 | 34613 | 5641 | 123294 | 163959 |
| Pakistan | 732 | 5438 | 2387 | 5408 | 16473 | 17789 |
| Vietnam | 1657 | 8050 | 4500 | 7150 | 48325 | 52825 |

Source: UNCTAD, World Investment Report, 2010

**Table 5.4.2.4: Proposed Local and Foreign Private Investment in Bangladesh** (in Million US$)

| Year | Proposed Local Investment | | Proposed Foreign Investment | | Total Proposed Investment | | Growth % |
|---|---|---|---|---|---|---|---|
| | Project | US$ m | Project | US$ m | Project | US$ m | |
| 2006 | 1754 | 2,662 | 135 | 3,621 | 1889 | 6,283 | 125% |
| 2007 | 1930 | 2,849 | 191 | 1,728 | 2121 | 4,577 | -27% |
| 2008 | 1615 | 2,834 | 143 | 787 | 1758 | 3,621 | -21% |
| 2009 | 1336 | 2,481 | 132 | 2,138 | 1468 | 4,618 | 27% |
| 2010 | 1600 | 6298 | 185 | 3174 | 1785 | 9472 | 105% |

Source: Provisional Data from BOI, 20112.

**Table 5.4.3.1: Sector-wise Distribution of Foreign and Joint Venture Investment Projects (in Million US$)**

| Sectors | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
|---|---|---|---|---|---|---|---|---|---|
| Agro based Industry | 15.93 | 36.416 | 35.479 | 22.557 | 22.231 | 122.516 | 96.902 | 94.77 | 28.70 |
| Food & Allied Industry | 1.218 | 3.007 | 1.898 | 1.997 | 0.092 | 12.836 | 98.919 | 13.39 | 4.34 |
| Textile Industry | 114.1 | 181.03 | 274.87 | 36.402 | 72.521 | 160.143 | 249.502 | 55.47 | 0.82 |
| Printing & Publishing Industry | 0.147 | 4.428 | 0 | 0 | 2.697 | 0.000 | 0.758 | 0.0 | 0.0 |
| Tannery & Leather Industry | 6.881 | 8.388 | 0.375 | 2.151 | 13.661 | 5.984 | 17.525 | 57.29 | 30.94 |
| Chemical Industry | 1878.2 | 44.563 | 57.435 | 5.631 | 61.698 | 69.535 | 165.309 | 29.66 | 13.77 |
| Glass & Ceramics Industry | 0 | 0 | 0.169 | 17.695 | | 26.373 | 60.447 | 1.68 | 0.0 |
| Engineering Industry | 20.203 | 25.911 | 77.578 | 121.41 | 17.364 | 1285.94 | 3574.13 | 23.69 | 222.38 |
| Service Industry | 1313.9 | 1156.4 | 176.51 | 1863.8 | 651.196 | 3431.53 | 83.661 | 2483.75 | 1679.14 |
| Miscellaneous (NEC) | 0 | 0.620 | 0.045 | 0 | 0.092 | 0.735 | 13.355 | 46.57 | 2.49 |
| Total | 3353.5 | 1460.7 | 624.36 | 2071.7 | 841.552 | 5115.58 | 4306.51 | 2806.30 | 1982.61 |

Source: Bangladesh Economic Review 2014.

**Table 5.5.2.1: Export Earnings Composition and Growth of Export Income**

| Commodity Classification | Total Export Earnings (million US$) | | | | % of Total Export Earnings | | | | Growth Rate (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2010-11 | 2011-12 | 2012-13 | 2013-14 |
| Primary Product | 1360.0 | 1267.0 | 1310 | 899 | 5.7 | 5.2 | 4.8 | 4.5 | 48.9 | -37 | 3.4 | 5.8 |
| Frozen Food | 625 | 598.4 | 544 | 458 | 2.73 | 2.5 | 2.0 | 2.3 | 40.4 | -4.3 | -9.0 | 24.1 |
| Agricultural Product | 262 | 304 | 351 | 226 | 1.1 | 1.3 | 1.3 | 1.1 | 42.4 | 16.0 | 15.5 | 0.0 |
| Industrial Product | 21612 | 23021 | 25717 | 18930 | 94.3 | 94.8 | 95.2 | 95.5 | 41 | 6.5 | 11.6 | 14.4 |
| Woven Garments | 8432 | 9603.3 | 11040 | 8228 | 36.78 | 39.5 | 40.8 | 41.5 | 40.2 | 13.9 | 15.0 | 15.9 |
| Knitwear | 9482 | 9486.4 | 10476 | 7910 | 47.44 | 39.1 | 38.8 | 39.9 | 46.3 | 0.0 | 10.4 | 17.5 |
| Leather | 298 | 330.2 | 400 | 333 | 1.30 | 1.4 | 1.5 | 1.7 | 31.9 | 10.8 | 21.2 | 44.2 |
| Jute Goods | 758 | 701.1 | - | - | 3.31 | 2.9 | - | - | 40.4 | -7.5 | - | - |
| Fertilizer & Chem. Pro. | 105 | 103 | 93 | 68 | 0.46 | 0.4 | 0.3 | 0.3 | 1.9 | -1.9 | -9.7 | 3.0 |
| Footwear | 298 | 336 | 419 | 377 | 1.30 | 1.4 | 1.6 | 1.9 | 46.1 | 30.1 | 24.7 | 31.8 |
| Ceramic Pro. | 37.58 | 33.8 | - | - | 0.16 | 0.1 | - | - | 22.1 | -10.2 | - | - |
| Engineering Pr. | 310 | 376 | 368 | 235 | 1.35 | 1.5 | 1.4 | 1.2 | -0.3 | 21.3 | -2.1 | -5.6 |
| Petroleum Pro. | 261 | 275 | 314 | 110 | 1.14 | 1.1 | 1.2 | 0.6 | -13.4 | 5.5 | 14.2 | -51.8 |
| Handicrafts | 4 | 5 | 6 | 5 | 0.02 | 0.0 | 0.0 | 0.0 | 18.7 | 25.0 | 20.0 | 25.0 |
| Others | 1666.4 | 1772.0 | 2601 | 1664 | 7.1 | 7.3 | 6.7 | 6.1 | 46.8 | 6.2 | -1.1 | 6.5 |
| Total | 22928 | 24288 | 27027 | 19829 | 100 | 100 | 100 | 100 | 41.5 | 5.9 | 11.2 | 14.0 |

Source: Data of Export Promotion Bureau of Bangladesh published by Bangladesh Economic Review, 2014.

**Table 5.5.2.2: Export from Bangladesh to SAARC Member Countries (In Million US$)**

| Country | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|
| Afghanistan | 6.07 | 0.51 | 0.88 | 0.75 | 2.77 | 3.68 | 2.74 | 3.53 | 3.59 |
| Bhutan | 3.99 | 3.35 | 1.65 | 1.40 | 1.35 | 0.61 | 2.24 | 3.12 | 9.13 |
| India | 101.16 | 186.95 | 279.14 | 289.41 | 358.08 | 276.58 | 304.63 | 512.51 | 498.42 |
| Maldives | - | 0.48 | 0.26 | 0.27 | 0.08 | 0.14 | 0.74 | 0.93 | 1.78 |
| Nepal | 1.27 | 0.47 | 0.83 | 0.85 | 6.71 | 8.06 | 8.79 | 10.84 | 41.58 |
| Pakistan | 34.78 | 84.14 | 50.26 | 61.06 | 71.01 | 76.22 | 77.67 | 86.79 | 73.21 |
| Sri Lanka | 10.15 | 12.16 | 14.39 | 14.82 | 19.32 | 18.67 | 23.74 | 34.73 | 42.59 |
| Total | 157.42 | 288.06 | 347.41 | 368.56 | 459.32 | 383.96 | 420.55 | 652.45 | 670.30 |

Source: Data of Bangladesh Export Promotion Bureau published by Bangladesh Economic Review, 2012.

**Table 5.5.3.1: Comparative Situation of Commodity-wise Import Payment (In Million US$)**

| Commodity/ FY | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|
| Major Primary Goods | 1854 | 2069 | 3455 | 2916 | 2940 | 5591 | 4149 | 4075 | 2877 |
| Major Industrial Commodities | 3002 | 3568 | 4844 | 5035 | 4957 | 7546 | 9263 | 8529 | 5370 |
| Capital Machinery | 1458 | 1929 | 1664 | 1420 | 1595 | 2324 | 2005 | 1835 | 1264 |
| Other Commodities (including EPZ) | 8432 | 9591 | 11666 | 13136 | 14246 | 18196 | 20099 | 19645 | 13585 |
| Grand Total | 14746 | 17157 | 21629 | 22507 | 23738 | 33657 | 35516 | 34084 | 23096 |
| % Change | 12.2 | 16.4 | 26.1 | 4.1 | 5.5 | 41.8 | 5.5 | -4.0 | 16.5 |

Source: Data of Bangladesh Bank published by Bangladesh Economic Review, 2014.

**Table 5.5.5.1: Average Exchange Rate in Bangladesh (Tk. per US $)**

| Fiscal Year | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average Exchange Rate | 57.90 | 58.94 | 61.39 | 67.08 | 69.03 | 68.60 | 68.80 | 69.18 | 71.17 | 81.87 | 77.75 | 77.74 |

Source: Bangladesh Economic Reviews 2012, 2014 (Bangladesh Bank). * March 2014.

**Table 5.5.6.1: Foreign Exchange Reserve in Bangladesh (In Million US $)**

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amount | 1602 | 1307 | 1583 | 2470 | 2705 | 2930 | 3484 | 5077 | 6149 | 7471 | 10750 | 10912 | 10364 | 15315 | 20370 |

Source: Bangladesh Economic Reviews 2012, 2014 (Bangladesh Bank). * 30 April, 2014.

**Table 7.1.1: Trends of the Variables for Domestic Investment Function for Bangladesh** (constant US$)

| Year | lngr gdp | lndi | lnfdi | ln fi | ln rx | ln hc | lncr | Year | lngr gdp | lndi | lnfdi | ln fi | ln rx | ln hc | lncr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 0.00 | 1.55 | -6.55 | 2.19 | 1.74 | 2.97 | 2.17 | 1993 | 1.52 | 2.89 | -3.16 | 3.27 | 2.20 | 2.92 | 3.04 |
| 1973 | 1.20 | 2.16 | -3.54 | 2.33 | 1.88 | 2.99 | 2.45 | 1994 | 1.41 | 2.91 | -3.41 | 3.37 | 2.20 | 2.80 | 3.05 |
| 1974 | 2.26 | 2.00 | -4.04 | 2.62 | 1.31 | 2.92 | 2.69 | 1995 | 1.59 | 2.95 | -5.30 | 3.36 | 2.39 | 2.91 | 3.28 |
| 1975 | 0.00 | 1.82 | -4.83 | 2.12 | 1.06 | 2.90 | 2.26 | 1996 | 1.53 | 2.99 | -3.40 | 3.38 | 2.41 | 2.99 | 3.36 |
| 1976 | 1.73 | 2.29 | -2.92 | 2.44 | 1.56 | 2.86 | 2.53 | 1997 | 1.68 | 3.03 | -1.11 | 3.39 | 2.48 | 3.02 | 3.40 |
| 1977 | 0.98 | 2.44 | -2.62 | 2.66 | 1.95 | 2.84 | 2.77 | 1998 | 1.65 | 3.07 | -0.84 | 3.39 | 2.59 | 3.00 | 3.41 |
| 1978 | 1.96 | 2.45 | -2.85 | 2.60 | 1.72 | 2.87 | 2.64 | 1999 | 1.58 | 3.10 | -0.93 | 3.44 | 2.58 | 2.98 | 3.46 |
| 1979 | 1.56 | 2.42 | 0.04 | 2.63 | 1.81 | 2.83 | 2.70 | 2000 | 1.78 | 3.14 | -0.52 | 3.54 | 2.64 | 3.00 | 3.53 |
| 1980 | -0.20 | 2.67 | -3.06 | 2.65 | 1.70 | 2.92 | 2.81 | 2001 | 1.66 | 3.14 | -1.79 | 3.83 | 2.73 | 2.99 | 3.87 |
| 1981 | 1.34 | 2.87 | -3.61 | 2.67 | 1.66 | 2.80 | 2.91 | 2002 | 1.48 | 3.14 | -2.21 | 3.89 | 2.66 | 2.98 | 3.92 |
| 1982 | 0.87 | 2.88 | -3.26 | 2.67 | 1.65 | 2.91 | 2.89 | 2003 | 1.66 | 3.15 | -0.66 | 3.93 | 2.65 | 3.01 | 3.91 |
| 1983 | 1.39 | 2.83 | -6.05 | 2.89 | 1.75 | 2.99 | 2.96 | 2004 | 1.84 | 3.18 | -0.23 | 3.96 | 2.74 | 3.77 | 3.95 |
| 1984 | 1.65 | 2.77 | 0.06 | 3.01 | 1.19 | 3.02 | 3.04 | 2005 | 1.78 | 3.20 | 0.23 | 4.00 | 2.81 | 3.84 | 4.01 |
| 1985 | 1.17 | 2.79 | 0.01 | 3.01 | 1.71 | 3.00 | 3.07 | 2006 | 1.89 | 3.26 | 0.01 | 3.92 | 2.79 | 3.87 | 3.91 |
| 1986 | 1.45 | 2.82 | -4.46 | 3.04 | 1.68 | 2.98 | 3.04 | 2007 | 1.95 | 3.26 | -0.20 | 3.92 | 2.83 | 3.89 | 3.91 |
| 1987 | 1.32 | 2.77 | -4.31 | 3.07 | 1.64 | 3.00 | 3.03 | 2008 | 1.79 | 3.27 | 0.11 | 3.93 | 2.87 | 3.91 | 3.94 |
| 1988 | 0.77 | 2.79 | -4.94 | 3.10 | 1.73 | 2.99 | 3.05 | 2009 | 1.62 | 3.27 | -0.22 | 4.00 | 2.83 | 3.91 | 3.96 |
| 1989 | 0.96 | 2.82 | -6.99 | 3.17 | 1.75 | 2.98 | 3.16 | 2010 | 1.72 | 3.27 | -0.29 | 4.07 | 2.77 | 3.84 | 4.05 |
| 1990 | 1.78 | 2.84 | -4.53 | 3.15 | 1.81 | 3.01 | 3.11 | 2011 | 1.87 | 3.31 | -0.08 | 4.09 | 2.99 | 3.81 | 4.12 |
| 1991 | 1.21 | 2.83 | -5.41 | 3.18 | 1.90 | 2.97 | 3.03 | 2012 | 1.88 | 3.34 | 0.10 | 4.11 | 3.00 | 3.82 | 4.09 |
| 1992 | 1.62 | 2.85 | -4.44 | 3.21 | 2.03 | 2.83 | 3.02 | 2013 | 1.79 | 3.35 | 0.00 | 4.12 | 2.97 | 3.82 | 4.06 |

Sources: World Development Indicators 2014, Bangladesh Economic Reviews, Statistical Year Books of Bangladesh, and various Domestic and International Reports.

Note: Trade openness and real terms are own estimated.

*Data have been rounded within 2 digits after decimal

### Table 8.1.1: Trends of the Variables for FDI Function in Bangladesh (in Current US$)

| Year | ln fdi | ln gdp | ln grgdp | lngcf | ln to | ln wr | Year | ln fdi | ln gdp | Ln grgdp | Ln gcf | ln to | ln wr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 11.41 | 22.56 | 0.00 | 1.55 | 3.85 | 4.88 | 1993 | 16.46 | 24.22 | 1.52 | 2.89 | 3.22 | 7.44 |
| 1973 | 14.67 | 22.81 | 1.20 | 2.16 | 3.27 | 5.15 | 1994 | 16.23 | 24.24 | 1.41 | 2.91 | 3.16 | 7.49 |
| 1974 | 14.60 | 23.25 | 2.26 | 1.99 | 2.73 | 5.40 | 1995 | 14.46 | 24.36 | 1.59 | 2.95 | 3.46 | 7.55 |
| 1975 | 14.25 | 23.69 | 0.00 | 1.82 | 2.71 | 5.50 | 1996 | 16.42 | 24.43 | 1.53 | 2.99 | 3.53 | 7.60 |
| 1976 | 15.51 | 23.03 | 1.73 | 2.29 | 2.95 | 5.53 | 1997 | 18.75 | 24.47 | 1.68 | 3.03 | 3.52 | 7.67 |
| 1977 | 15.76 | 22.99 | 0.98 | 2.44 | 2.59 | 5.63 | 1998 | 19.06 | 24.51 | 1.65 | 3.07 | 3.54 | 7.72 |
| 1978 | 15.86 | 23.31 | 1.96 | 2.45 | 2.80 | 5.85 | 1999 | 19.01 | 24.55 | 1.58 | 3.10 | 3.51 | 7.78 |
| 1979 | 0.00 | 23.47 | 1.57 | 2.42 | 2.87 | 6.07 | 2000 | 19.45 | 24.58 | 1.78 | 3.14 | 3.56 | 7.82 |
| 1980 | 15.96 | 23.62 | -0.20 | 2.67 | 3.07 | 6.20 | 2001 | 18.18 | 24.57 | 1.66 | 3.14 | 3.63 | 7.88 |
| 1981 | 15.49 | 23.71 | 1.34 | 2.87 | 3.14 | 6.34 | 2002 | 17.77 | 24.59 | 1.49 | 3.14 | 3.51 | 7.98 |
| 1982 | 15.76 | 23.62 | 0.87 | 2.88 | 3.17 | 6.39 | 2003 | 19.41 | 24.67 | 1.66 | 3.15 | 3.53 | 8.04 |
| 1983 | 12.91 | 23.57 | 1.39 | 2.83 | 3.13 | 6.53 | 2004 | 19.92 | 24.76 | 1.84 | 3.18 | 3.58 | 8.10 |
| 1984 | 0.00 | 23.70 | 1.64 | 2.77 | 3.044 | 6.60 | 2005 | 20.45 | 24.82 | 1.78 | 3.20 | 3.68 | 8.16 |
| 1985 | 0.00 | 23.80 | 1.17 | 2.79 | 3.06 | 6.80 | 2006 | 20.41 | 25.00 | 1.89 | 3.26 | 3.81 | 8.24 |
| 1986 | 14.70 | 23.78 | 1.45 | 2.82 | 2.99 | 6.99 | 2007 | 20.29 | 25.10 | 1.95 | 3.26 | 3.88 | 8.35 |
| 1987 | 14.98 | 23.89 | 1.32 | 2.77 | 2.99 | 7.09 | 2008 | 20.75 | 25.24 | 1.80 | 3.27 | 3.84 | 8.52 |
| 1988 | 14.42 | 23.97 | 0.77 | 2.79 | 3.05 | 7.16 | 2009 | 20.53 | 25.35 | 1.62 | 3.27 | 3.78 | 8.61 |
| 1989 | 12.42 | 24.01 | 0.96 | 2.82 | 3.15 | 7.26 | 2010 | 20.57 | 25.47 | 1.72 | 3.27 | 3.73 | 8.66 |
| 1990 | 14.99 | 24.13 | 1.78 | 2.84 | 3.21 | 7.30 | 2011 | 20.89 | 25.58 | 1.87 | 3.31 | 3.92 | 8.77 |
| 1991 | 14.15 | 24.16 | 1.21 | 2.83 | 3.05 | 7.35 | 2012 | 21.11 | 25.62 | 1.88 | 3.34 | 3.97 | 8.91 |
| 1992 | 15.13 | 24.18 | 1.62 | 2.85 | 3.01 | 7.40 | 2013 | 21.13 | 25.73 | 1.79 | 3.35 | 3.93 | 9.03 |

Sources: World Development Indicators 2014, Bangladesh Economic Reviews, Statistical Year Books of Bangladesh, and various Domestic and International Reports. Trade openness and real terms are own estimated.

*Data have been rounded within 2 digits after decimal.

### Table 9.1.1: Trends of the Variables for TO Function in Bangladesh (Data constant 2005 US$)

| Year | ln to | ln gdp | ln rx | lnrm | lntot | ln ri | lnrer | Year | ln to | ln gdp | ln rx | lnrm | lntot | ln ri | lnrer |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 3.85 | 23.44 | 19.83 | 22.63 | 1.81 | 2.34 | 1.37 | 1993 | 3.22 | 24.22 | 21.77 | 22.41 | 4.31 | 1.10 | 3.34 |
| 1973 | 3.27 | 23.47 | 20.45 | 21.92 | 3.13 | 2.42 | 1.40 | 1994 | 3.16 | 24.26 | 21.81 | 22.35 | 4.32 | 1.67 | 3.39 |
| 1974 | 2.73 | 23.56 | 20.10 | 21.46 | 3.24 | 2.66 | 1.47 | 1995 | 3.46 | 24.30 | 22.08 | 20.09 | 4.29 | 2.33 | 3.46 |
| 1975 | 2.71 | 23.52 | 20.21 | 21.34 | 3.47 | 2.09 | 1.85 | 1996 | 3.53 | 24.35 | 22.15 | 22.87 | 4.43 | 0.87 | 3.49 |
| 1976 | 2.95 | 23.57 | 20.43 | 21.66 | 3.38 | 2.33 | 1.93 | 1997 | 3.52 | 24.40 | 22.31 | 22.86 | 4.53 | 1.67 | 3.57 |
| 1977 | 2.59 | 23.60 | 20.66 | 21.07 | 4.03 | 2.50 | 1.91 | 1998 | 3.54 | 24.45 | 22.42 | 22.90 | 4.55 | 2.13 | 3.70 |
| 1978 | 2.80 | 23.67 | 20.58 | 21.53 | 3.63 | 2.21 | 1.94 | 1999 | 3.51 | 24.50 | 22.45 | 22.92 | 4.52 | 1.81 | 3.78 |
| 1979 | 2.87 | 23.72 | 20.73 | 21.64 | 3.65 | 2.11 | 1.95 | 2000 | 3.56 | 24.56 | 22.58 | 23.02 | 4.61 | 0.79 | 3.83 |
| 1980 | 3.07 | 23.72 | 20.74 | 21.92 | 3.64 | 2.31 | 1.99 | 2001 | 3.63 | 24.61 | 22.72 | 23.13 | 4.54 | 0.70 | 3.89 |
| 1981 | 3.14 | 23.76 | 20.99 | 21.98 | 3.64 | 2.33 | 2.10 | 2002 | 3.51 | 24.65 | 22.70 | 23.01 | 4.60 | 1.20 | 3.94 |
| 1982 | 3.17 | 23.78 | 20.94 | 22.07 | 3.71 | 2.70 | 2.36 | 2003 | 3.53 | 24.70 | 22.76 | 23.08 | 4.53 | 1.73 | 3.98 |
| 1983 | 3.13 | 23.82 | 21.03 | 22.03 | 3.78 | 2.43 | 2.53 | 2004 | 3.58 | 24.76 | 22.88 | 23.18 | 4.56 | 2.02 | 4.05 |
| 1984 | 3.04 | 23.87 | 21.02 | 21.96 | 3.76 | 2.53 | 2.61 | 2005 | 3.68 | 24.82 | 23.03 | 23.35 | 4.53 | 1.95 | 4.16 |
| 1985 | 3.06 | 23.91 | 21.10 | 22.03 | 3.94 | 1.81 | 2.78 | 2006 | 3.81 | 24.89 | 23.26 | 23.52 | 4.63 | 1.91 | 4.27 |
| 1986 | 2.99 | 23.95 | 21.09 | 21.99 | 3.81 | 2.60 | 2.95 | 2007 | 3.88 | 24.95 | 23.38 | 23.67 | 4.53 | 2.21 | 4.33 |
| 1987 | 2.99 | 23.98 | 21.10 | 22.05 | 3.94 | 2.29 | 3.02 | 2008 | 3.84 | 25.01 | 23.45 | 23.65 | 4.49 | 2.19 | 4.37 |
| 1988 | 3.05 | 24.01 | 21.21 | 22.12 | 4.02 | 2.00 | 3.08 | 2009 | 3.78 | 25.06 | 23.45 | 23.62 | 4.56 | 1.69 | 4.43 |
| 1989 | 3.15 | 24.03 | 21.29 | 22.26 | 3.84 | 1.80 | 3.11 | 2010 | 3.73 | 25.12 | 23.46 | 23.63 | 4.56 | 2.10 | 4.50 |
| 1990 | 3.21 | 24.09 | 21.46 | 22.35 | 4.10 | 1.81 | 3.18 | 2011 | 3.92 | 25.18 | 23.71 | 23.89 | 4.54 | 2.37 | 4.64 |
| 1991 | 3.05 | 24.12 | 21.42 | 22.18 | 4.17 | 1.85 | 3.26 | 2012 | 3.97 | 25.24 | 23.83 | 23.99 | 4.63 | 1.83 | 4.80 |
| 1992 | 3.01 | 24.17 | 21.62 | 22.09 | 4.30 | 1.29 | 3.33 | 2013 | 3.93 | 25.30 | 23.85 | 24.00 | 4.71 | 2.02 | 4.79 |

Sources: World Development Indicators 2014, Bangladesh Economic Reviews, Statistical Year Books of Bangladesh, and various Domestic and International Reports.

Note: Trade openness and real terms are own estimated.

*Data have been rounded within 2 digits after decimal

**Table 10.1.1: Trends of Variables of the GDP Growth Function in Bangladesh**

| Year | lngdp | ln l | ln di | ln fdi | ln to | Year | lngdp | ln l | ln di | ln fdi | ln to |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1972 | 22.56 | 3.01 | 19.50 | 11.41 | 3.85 | 1993 | 24.22 | 3.19 | 22.51 | 16.46 | 3.22 |
| 1973 | 22.81 | 3.12 | 20.37 | 14.67 | 3.27 | 1994 | 24.24 | 3.19 | 22.55 | 16.23 | 3.16 |
| 1974 | 23.25 | 3.13 | 20.64 | 14.60 | 2.73 | 1995 | 24.36 | 3.19 | 22.70 | 14.46 | 3.46 |
| 1975 | 23.69 | 3.15 | 20.90 | 14.25 | 2.71 | 1996 | 24.43 | 3.19 | 22.82 | 16.42 | 3.53 |
| 1976 | 23.03 | 3.16 | 20.72 | 15.51 | 2.95 | 1997 | 24.47 | 3.20 | 22.89 | 18.75 | 3.52 |
| 1977 | 22.99 | 3.14 | 20.83 | 15.76 | 2.59 | 1998 | 24.51 | 3.20 | 22.98 | 19.06 | 3.54 |
| 1978 | 23.31 | 3.14 | 21.15 | 15.86 | 2.80 | 1999 | 24.55 | 3.20 | 23.04 | 19.01 | 3.51 |
| 1979 | 23.47 | 3.15 | 21.28 | 0.25 | 2.87 | 2000 | 24.58 | 3.20 | 23.11 | 19.45 | 3.56 |
| 1980 | 23.62 | 3.16 | 21.68 | 15.96 | 3.07 | 2001 | 24.57 | 3.20 | 23.11 | 18.18 | 3.63 |
| 1981 | 23.71 | 3.16 | 21.97 | 15.50 | 3.14 | 2002 | 24.59 | 3.20 | 23.12 | 17.77 | 3.51 |
| 1982 | 23.62 | 3.17 | 21.89 | 15.76 | 3.17 | 2003 | 24.67 | 3.20 | 23.22 | 19.41 | 3.53 |
| 1983 | 23.57 | 3.16 | 21.79 | 12.91 | 3.13 | 2004 | 24.76 | 3.21 | 23.33 | 19.92 | 3.58 |
| 1984 | 23.70 | 3.16 | 21.86 | 0.12 | 3.05 | 2005 | 24.82 | 3.21 | 23.42 | 20.45 | 3.68 |
| 1985 | 23.80 | 3.17 | 21.98 | 0.36 | 3.06 | 2006 | 25.00 | 3.21 | 23.66 | 20.41 | 3.81 |
| 1986 | 23.78 | 3.17 | 21.99 | 14.71 | 2.99 | 2007 | 25.10 | 3.22 | 23.76 | 20.29 | 3.88 |
| 1987 | 23.89 | 3.17 | 22.06 | 14.98 | 2.99 | 2008 | 25.24 | 3.22 | 23.90 | 20.75 | 3.84 |
| 1988 | 23.97 | 3.17 | 22.15 | 14.42 | 3.05 | 2009 | 25.35 | 3.23 | 24.01 | 20.53 | 3.78 |
| 1989 | 24.01 | 3.18 | 22.22 | 12.42 | 3.15 | 2010 | 25.47 | 3.23 | 24.13 | 20.57 | 3.73 |
| 1990 | 24.13 | 3.18 | 22.36 | 14.99 | 3.21 | 2011 | 25.58 | 3.24 | 24.29 | 20.89 | 3.92 |
| 1991 | 24.16 | 3.18 | 22.38 | 14.15 | 3.05 | 2012 | 25.62 | 3.24 | 24.35 | 21.11 | 3.97 |
| 1992 | 24.18 | 3.18 | 22.43 | 15.13 | 3.01 | 2013 | 25.73 | 3.25 | 24.47 | 21.13 | 3.93 |

Sources: World Development Indicators 2014, Bangladesh Economic Reviews, Statistical Yearbooks of Bangladesh and Various Local and International Sources.

Note: Data have been rounded at two digits after decimal.

## Bibliography


Abedin, M. Z. (2014). *A hand book of research.* Revised Edition, Dhaka: Book Syndicate.

Adams, S. (2009). Foreign direct investment, domestic investment, and economic growth in Sub-Saharan Africa. *Journal of Policy Modeling*, Vol. 31, pp. 939-949.

ADB (1997-98). *Asian development outlook.* China: Oxford University Press.

ADB (2001). *Key indicators.* USA: Oxford University Press.

ADB.(2005). *Asian development outlook.* Manila, Philippines: Oxford University Press.

Adeolu, B. A. (2007). *Foreign direct investment and economic growth: Evidence from Nigeria*. Department of Agricultural Economics, Obafemi Awolowo University, Ile-Ife, Nigeria. AERC Research Paper 165, African Economic Research Consortium, Nairobi.

Adhikary, B. K. (2011). FDI, trade openness, capital formation and economic growth in Bangladesh: A linkage analysis. *International Journal of Business and Management*, Oita-ken, Japan, Vol. 6, No. 1.Retrieved from www.ccsenet.org/journal/index.php/ijbm/article/download/7472/6488. Cited on 07/09/2015.

Adhikary, B. K. (2012). Impact of foreign direct investment, trade openness, domestic demand, and exchange rate on the export performance of Bangladesh: A VEC approach. *Economics Research International*, Oita-ken, Japan. Retrieved from http://dx.doi.org/10.1155/2012/463856. Cited on 17/09/2015.

Adnan, H. Q. M. (2011). Financial development index and economic growth: Empirical evidence from India. *The Journal of Risk Finance*, Emerald Group Publishing Limited, Vol. 12, No. 2, p. 98.

Agosín, M. R. (1991). *Trade policy reform and economic performance: A review of the issues and some preliminary evidence.* UNCTAD Discussion Papers 41, UNCTAD, Geneva, Switzerland.

Agosin, M. R., & Mayer, R. (2000). *Foreign investment in developing countries: Does it crowd in domestic investment?* UNCTAD Discussion Paper 146, Geneva, Switzerland.

Agrawal, G., & Khan, A. M. (2011). Impact of FDI on GDP: A comparative study of China and India. *International Journal of Business and Management*, Vol. 6, No. 10.

Ahamed, M. G., & Tanin, F. (2010). *Determinants of and the relationship between FDI and economic growth in Bangladesh.* Bonn Econ. Discussion Papers, (BGSE), University of Bonn.

Ahmed, N. (2000). Export response to trade liberalization in Bangladesh: A cointegration analysis. *Applied Economics*, Vol. 32, No. 8, pp. 1077-1084. Retrived from www.researchgate.net/.../24074625. *Cited on 15/05/2014.*

Ahmed, Q. M. (1992). *Foreign aid, domestic savings and economic growth: The experience of Bangladesh, 1972-1991*. Unpublished PhD thesis, Department of Economics, University of Illinois, USA. Retrieved form https://www.ideals.illinois.edu/handle/2142/21130. Cited on 17/09/2015.

Ahmed, S. (1975). Foreign capital inflow and economic growth: A two gap model for the Bangladesh economy. *The Bangladesh Development Studies*, Vol. 3, No. 2, pp.115-123.

Ahmed, S. (1985). *Domestic savings and foreign capital inflow: The case of Bangladesh.* Dhaka: The Bangladesh Institute of Development Studies (BIDS).

Ahmed, S. (2001). Bangladesh since independence: Development performance, constraints and challenges. *Bangladesh Journal of Political Economy*, Vol. 15, No. 1.

Ahmed, S., & Sattar, Z. (2004). *Trade liberalization, growth and poverty reduction: The case of Bangladesh.* World Bank Policy Research Working Paper 34204, Washington D.C: The World Bank.

Aitken, B., & Harrison, A. E. (1999). Do domestic firms benefit from direct foreign investment? *American Economic Review*, Vol. 89, pp. 605-618.

Akaike, H. (1969). Power spectrum estimation through autoregressive model fitting. *Annals of the Institute of Statistical Mathematics*, Vol. 21, No. 1, pp. 407- 419.

Akhtaruzzaman, M. (2005). *Inflation in the open economy: An application of the error correction approach to the recent experience in Bangladesh.* Dhaka: Bangladesh Bank.

Akinkugbe, O. (2003). *Flow of FDI to hitherto neglected developing countries.* WIDER, discussion paper No. 2003/2, United Nations University, Helsinki.

Akinlo, A. E. (2004). Foreign direct investment and growth in Nigeria: An empirical investigation. *Journal of Policy Modeling*, Vol. 26, pp. 627-639.

Alam, S. M., & Zubayer, M. (2010). Intra regional foreign direct investment (FDI) prospect in South Asian association of regional cooperation (SAARC) region. *International Journal of Economics and Fina*nce, Vol. 2, No. 3.

Alfaro, L., Chanda, A., Kalemli-Ozcan, S., & Sayek, S. (2000). *FDI and economic growth: The role of local financial markets.* University of Houston, USA: Harvard Business School.

Alguacil, M., Cuadros, A., & Orts, V. (2005). *Inward FDI and growth: The role of macroeconomic and institutional environment.* Riu Sec, Spain: Institute of International Economics, Universitat Jaume I Campus.

Al-Khatib, B. H., Al-Taleb, G. S., & Al-Okor, S. M. (2012). Economic determinants of domestic investment. *European Scientific Journal.* Retrieved by paperity.org/p/59029073/.Cited on 12/03/2016.

Aluko, S. A. (1961). Financing economic development in Nigeria. *The Nigerian Journal of Economic and Social Studies*, Vol. 3, No. 1, pp. 39-67.

Amin, S. (1974). *Accumulation on a world scale: A critique of the theory of underdevelopment.* New York, USA: Monthly Review Press.

Andriamananjara, S., & Nash, J. (1997). *Have trade policy reforms led to greater openness in developing countries?* World Bank Working Paper Series, 1730.

Anyanwu, J. C. (2004). *An economic investigations of the determinants of foreign direct investment in Nigeria.* Proceedings of the 1988 NES Annual Conference, 219-241, Lagos.

Appleyard, D. R., & Field, J. A. JR. (1998). *International economics* (3rd ed.). New York, USA: The McGraw-Hill Companies Inc.

Arize, A. C. (1996). The effects of exchange-rate volatility on US exports: An empirical investigation. *Southern Economic Journal,* Vol. 62, No. 1, pp. 34-43.

Arize, A., Osang, C. T., & Slottje, D. J. (2000). Exchange-rate volatility and foreign trade: Evidence from thirteen LDC's. *Journal of Business and Economic Statistics*, Vol. 18, No. 1, pp. 10-17.

Ashsraf, N. M. (2006). *Growth and diversification of foreign trade: Impact of the performance of external sector of Bangladesh economy*. Unpublished PhD thesis, Institute of Bangladesh Studies, University of Rajshahi.

Asiedu, E. (2002). On the determinants of foreign direct investment to developing countries: Is Africa different? *World Development*, Vol. 30, No. 1, pp. 107-119.

Asteriou, D., & Hall, S. G. (2007). *Applied econometrics (Rev. ed.)*. New York, USA: Palgrere Macmillian.

Atikson, A. B., & Brandolmi, A. (2001). Promise and pitfalls in the use of 'secondary' data sets: Income enequality in OECD countries as a case study. *Journal of Economic Literature,* Vol. 39, No. 3, pp. 771-799.

Babatunde, M. A. (2009). Can trade liberalization stimulate export performance in Sub-Saharan Africa? *Journal of International and Global Economic Studies,* Vol. 2, No. 1, pp. 68-92.

Bahmani-Oskooee, M., & Payesteh, S. (1993). Budget deficits and the value of the dollar: An application of cointegration and error-correction modeling. *Journal of Macroeconomics*, Vol. 15, No. 4, pp. 661-677.

Bailey, M. J., Tavlas, G. S., and Ulan, M. (1987). The impact of exchange-rate volatility on export growth: Some theoretical considerations and empirical results. *Journal of Policy Modeling*, Vol. 9, No. 1, pp. 225-243.

Bajwa, S., & Siddiqui, W. M. (2011). Trade openness and its effects on economic growth in selected South Asian countries: A panel data study. *World Academy of Science, Engineering and Technology,* Vol. 50.

Bakare, A. S. (2011). The determinants of private domestic investment in Nigeria. *Far East Journal of Psychology and Business*, Vol. 4, No. 2, Ondo State, Nigeria.

Balasubramanyam, V. N., Salisu, M., & Sapsford, D. (1996). Foreign direct investment and growth in EP and IS countries. *The Economic Journal*, Royal Economic Society, Oxford, UK. pp. 92-105.

Barro, R. J., & Sala-I-Martin, X. (1995). Capital mobility in neoclassical models of growth. *American Economic Review,* Vol. 85, pp. 103-115.

Barro, R. J. (1991). Economic growth in cross section of countries. *Quarterly Journal of Economics,* Vol. 106, pp. 407-444.

BB. (1991-2003). *Economic trends.[Monthly issues from 06/1991 to 07/2003]*. Dhaka: Bangladesh Bank.

BB. (2011). *Monetary policy statement July-December 2010.*Dhaka: Bangladesh Bank.

BBS. (1995-2013). *Statistical year books of Bangladesh*. Bangladesh Bureau of Statistics, Dhaka: Government of Bangladesh.

Beck, T., & Levine, R. (2004). Stock markets, banks and growth: Panel evidence. *Journal of Banking and Finance*, Vol. 28, No. 3, pp. 423-442.

Bengoa, M., & Blanca, S. (2003). Foreign direct investment, economic freedom and growth: New evidence from Latin America. *European Journal of Political Economy*, Santander, Spain, Vol. 19, pp. 529-545.

BER. (2005-2014). *Bangladesh economic review.* Dhaka: Finance Division, Ministry of Finance, Government of Bangladesh.

Berggren, N., & Jordahl, H. (2005). Does free trade really reduce growth? Further testing using the economic freedom index. *Public Choice*, the Ratio Institute, Stockholm, Sweden, Vol. 122, pp. 99-114.

Beugelsdijk, S., Smeets, R., & Zwinkels, R. (2008). The impact of horizontal and vertical FDI on host's country economic growth. *International Business Review*, Vol. 17, pp. 452-472.

Bhagwati, J., & Srinivasan, T. N. (2001). Trade and poverty in the poor countries. *American Economic Review*, Vol. 92, No. 2, pp.180-183.

Bhattacharya, D. (2005). *Bangladesh's experience with foreign direct investment, in foreign direct investment: High risk, low reward for development.* Bonn: Church Development Service (EED). pp. 51-66.

Bhattacharya, D. (2005). *State of the Bangladesh economy in FY06: Early signals and immediate outlook.* Dhaka: Bangladesh.

Bhavan, T., Xu, C., & Zhong, C. (2011). *Determinants and growth effect of FDI in South Asian economies: Evidence from a panel data analysis.* International Business Research, Canadian Center of Science and Education, Vol. 4, No. 1.

Bhuiyan, M. M. (Jan. 7, 2010). *Domestic Investment First.* On the writing of Jomo Kwame Sundaram, The Daily Star Bangladesh, The Press.

Bhuyan, A. R. (2011). Attracting foreign direct investment in Bangladesh. *Thoughts on Economics*, Vol. 21, No. 01.

Bhuyan, A. R. & Rashid, M. A. (1993). *Trade regimes and industrial growth: A case study of Bangladesh*. Bureau of Economic Research: University of Dhaka, Bangladesh.

BIDS. (2003). *Bangladesh institute of development studies.* Dhaka: Bangladesh.

Birdsall, N., & Hamoudi, A. (2012). *Commodity dependence, trade, and growth: When "openness" is not enough.* Centre for Global Development, Working Paper, No. 7.

Black, J. (2003). *Oxford dictionary of economics.* New York, USA: Oxford University Press.

Blomström, M., Kokko, A., & Zejan, M. (2000). *Foreign direct investment: Firm and host country strategies*. London, UK: Macmillan.

BOI. (2005-2012). *Investment Bulletin*. Board of Investment, Ministry of Finance: Government of Bangladesh.

Borensztein, E., Gregorio, J. D., & Lee, J. W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics*, Vol. 45, pp. 115-35.

Branson, W. H. (1999). *Macroeconomic theory and policy (*3rd ed.). New York, USA: Harper & Row Publishers.

Braunstein, E., & Epstein, G. (2002). *Bargaining power and foreign direct investment in China: Can 1.3 billions consumers tame the multinationals?* CEPA Working Paper/3, Centre for Economic Policy Analysis, New York, USA.

Burt, E. M. (1997). Developing countries and the framework for negotiations on foreign direct investment in the world trade organization. *American University International Law Review 12*, Vol. 6, pp. 1015-1061.

Büthe, T., & Milner, H. V. (2008). The politics of foreign direct investment into developing countries: Increasing FDI through international trade agreements. *American Journal of Political Science,* Vol. 52, No. 4, pp. 741-762.

Carsten, H., & Matthians, B. (2005). *Political risk, institutions and foreign direct investment.* HWWA Discussion Papers 315, Hamburg Institute of International Economics, Humburg, Germany.

Chakrabarti, A. (2001). The determinants of foreign direct investment: Sensitivity analysis of cross country regressions. *Kyklos,* Vol. 54, No. 1, pp. 149-169.

Chakraborty, C., & Nunnenkamp, P. (2008). Economic reforms, FDI, and economic growth in India: A sector level analysis. *World Development,* Kiel Institute for the World Economy, Germany, Vol. 36, No. 7, pp. 1192-1212.

Chaponnière, J. R., & Cling, J. P. (2009). Vietnam's export-led growth model and competition with China. *Journal of Economic International,* Vol. 118, pp. 101-130.

Chenery, H. B., & Watanabe, T. (1958). International comparison of the structure of production. *Econometrica,* Vol. 26, pp. 487-521.

Cheng, L., & Yum, K. K. (2000). The location of foreign direct investment in Chinese Regions: Further analysis of labour quality. *NBER-EASE,* Vol. 9. pp. 213-238. Retrived from www.nber.org/chapters/c8500. Cited on 08/09/2014.

Chimobi, O. P., & Uche, U. C. (2010). Export, domestic demand and economic growth in Nigeria: Granger causality analysis. *European Journal of Social Sciences*, Vol. 13, No. 2, pp. 211-218.

Choong, C-K., Yusop, Z., & Soo, S-C. (2004). Foreign direct investment, economic growth, and financial sector development: A comparative analysis. *ASEAN Economic Bulletin,* Vol. 21, No. 3, pp. 278-89.

Chowdhury, O. H., & Vander, W. G. (2004). *Economic reform and trade performance in South Asia.* Bangladesh Institute of Development Studies, Dhaka: The University Press Limited.

Coppock, J. D. (1962). *International economic stability*. New York, USA: McGraw Hill Companies Inc.

Dickey, D. A., & Fuller, W. A. (1979). Distributions of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association,* Vol. 74, No. 366, pp. 1057-1072.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica,* Vol. 49, pp. 1057-1072.

Dollar, D., & Kraay, A. (2001). Trade, growth and poverty. *Finance and Development*, Dhaka, Vol. 38, No. 3.

Dollar, D., & Kraay, A. (2002). *Institutions, trade and growth*. Forthcoming, Carnegie-Rochester Conference Series on Public Policy, World Bank.

Dritsaki, M., Dritsaki, C., & Adamopoulos, A. (2004). A causal relationship between trade, foreign direct investment and economic growth for Greece. *American Journal of Applied Science*, Vol. 1, No. 3, pp. 230-235.

Duasa, J. (2009). *Asymmetric cointegration relationship between real exchange rate and trade variables: The case of Malaysia*. MPRA Paper 14535.

Duce, M., & Espana, B. (2003). *Definitions of foreign direct investment (FDI): A methodological note*. CGFS Working Paper for BIS Meeting.

Edwards, S. (1992). Trade orientation, distortions and growth in developing countries. *Journal of Development Economics*, Vol. 39, pp. 31-57.

Eller, M., Haiss, P., & Steiner, K. (2006). Foreign direct investment in the financial sector and economic growth in Central and Eastern Europe: The crucial role of the efficiency channel. *Emerging Markets Review*, Moscow, Russia, Vol. 7, pp. 300-319.

Enders, W. (2004). *Applied econometric time series (2nd ed.)*. New York, USA: John Wiley & Sons Inc.

Endozien, E. G. (1968). Linkages, direct foreign investment and Nigeria's economic development. *The Journal of Economic and Social Studies*, Vol. 10, No. 2, pp. 119-203.

ESCAP (1998). *FDI in selected Asian Countries: Policies, related institution-building and regional cooperation.* Economic and Social Conference on Asia and Pacific, New York.

Eusuf, M. A., Faruque, A. B. M., & Rahman, A. (2007). *Institutions for facilitating FDI: Issues for BEPZA, Bangladesh.* IPPG briefing paper No. 10, School of Environment and Development, University Of Manchester.

Fabienne, F. (2007). Foreign direct investment and host country economic growth: Does the investor's country of origin play a role? *Transnational Corporations*, Vol. 16, No, 2, pp. 42-76.

Farzana, K. Q. (2014). A *time series analysis of export, import and economic growth in Bangladesh.* Unpublished PhD thesis, Institute of Bangladesh Studies, University of Rajshahi.

Feder, G. (1993). On exports and economic growth. *Journal of Development Economics*, Vol. 12, pp. 59-73.

Fosu, A. K. (1990). Exports and economic growth: The African case. *World Economic Development*, Vol. 18, No. 6, pp. 831-835.

Fosu, O. E., & Magnus, F. J. (2006). Bound testing approach to cointegration: An examination of foreign direct investment, trade and growth relationships. *American Journal of Applied Sciences*, Vol. 3, pp. 2079-2085.

Frankel, J. A., & Romer, D. (1999). Does trade cause growth? *The American Economic Review*, Vol. 89, No. 3, pp. 379-399. Retrieved from http://dx.doi.org/10.1257/aer.89.3.379. Cited on 17/09/2015.

Fuller, W. A. (1976). *Introduction to statistical time series*. New York, USA: John Wiley and Sons.

Ghali, K. H., & Al-Mutawa, A. (1999). The intertemporal causal dynamics between fixed capital formation and economic growth in the group of seven countries. *International Economic Journal*, Vol. 13, No. 2, pp. 31-37.

Ghosh, R. A., & Henrik, F. V. B. (2006). Foreign direct investment and economic growth: A time series approach. *Global Economy Journal*, Vol. 6, Issue. 1, No. 7.

Granger, C. W. J. (1988). Some recent developments in a concept of causality. *Journal of Econometrics*, Vol. 39, No. 1-2, pp. 199-211.

Greenaway, D., & Sapsford, D. (1994). What does liberalisation do for exports and growth? *Weltwirtschaftliches Archiv*, Vol. 130, No. 1, pp. 152-174.

Greenaway, D., Sapsford, D., & Pfaffenzeller, S. (2007). *Foreign direct investment, economic performance and trade liberalization*. The Authors Journal compilation, Oxford, U.K: Blackwell Publishing Ltd.

Gries, T., Kraft, M., & Meierrieks, D. (2009). Linkages between financial deepening, trade openness and economic development: Causality evidence from Sub-Saharan Africa. *World Development*, Vol. 37, No. 12, pp. 1849-1860.

Grossman, G., & Helpman, E. (1991). *Innovation and growth in the global economy*. Cambridge, UK: MIT Press.

Gujarati, D. (2011). *Econometrics by example*. London, U.K: Palgrave Macmillan Publishers Limited.

Gujarati, D. N. (2012). *Basic Econometrics (*4th ed.). New Delhi, India: Tata Mcgraw-Hill Publishing Company Limited.

Hansen, H., & Tarp, F. (2000). *Aid and growth regressions*. Research Paper, No. 00/7, Centre for Research in Economic Development and International Trade, University of Nottingham.

Haque, T. S. (2013). *Effect of public and private investment on economic growth in Bangladesh: An econometric analysis*. Research Study Series, No-FDRS 5.

Hassan, K. A. F. M., & Salim. R. A. (2011). Determinants of private investment: Time series evidence from Bangladesh. *The Journal of Developing Areas*, Vol. 45, No. 1.

Hejazi, W., Joseph, P. P., & Rotman, L. (2003). Motivations for FDI and domestic capital formation. *Journal of International Business Studies*, Vol. 34, pp. 282-289.

Heim, J. J. (2008). *The investment function: Determinants of demand for investment goods*. Rensslaer Working Papers in Economics.

Hermes, N., & Lensink, R. (2003). Foreign direct investment, financial development and economic growth. *The Journal of Development Studies*, Vol. 38.

Herzer, D. (2010). Outward FDI and economic growth. *Journal of Economic Studies*, Emerald Group Publishing Limited, Vol. 37, No. 5, pp. 476-494.

Higgins, B. (1996). Economic *development: Problems, principles and policies* (Rev. ed.). New Delhi, India: Universal Book Stall.

Hossain, A., & Kamal, H. M. (2012). Empirical relationship between foreign direct investment and economic output in South Asian countries: A study on Bangladesh, Pakistan and India. *Journal of International Business Research*, Canadian Center of Science and Education, Vol. 5, No. 1.

Hossain, M. A., & Alauddin, M. (2005). Trade liberalization in Bangladesh: The process and its impact on macro variables particularly export expansion. *The Journal of Developing Areas*, Vol. 39, No. 1.

Hossain, M. A. (2013). *Trade liberalisation and economic performance: Analytics and empirics from Bangladesh*. Unpublished PhD thesis, School of Economics, The University of Queensland. Retrieved fromhttp://espace.library.uq.edu.au/view/UQ:221966.Cited on 11/09/2014.

Hossain, M. (28 December, 2014). The Daily Independent. Dhaka: The Press.

Hsiao, F. S. T., & Hsiao, M. C. W. (2006). FDI, exports and GDP in East and Southeast Asia-Panel data versus time-series causality analyses. *Journal of Asian Economics*, Vol. 17, No. 6, pp. 1082-1106.

Hubert, P. J., & Phanindra, V. W. (2004). Determinants of foreign direct investment: Empirical evidence from EU accession candidates. *Applied Economics*, Vol. 36, pp. 505-509.

Humayara, M. U., Siddiqui, S. A., & Ibne Afzal, M. N. (2012). An empirical investigation on trade openness and economic growth in Bangladesh economy. *Asian Social Science*, Vol. 8, No. 11, pp. 154-159.

Hye, Q. M. A. (2011). Financial development index and economic growth: Empirical evidence from India. *The Journal of Risk Finance*, Vol. 12, No. 2, pp. 98-111.

Ikiara, M. M. (2003). *Foreign direct investment (FDI), technology transfer and poverty alleviations: Africa's hopes and dilemma.* ATPS Special Paper Series, Nairobi, Kenya, No. 16, pp. 3.

Islam, N. (1983). Direct foreign investment in the third world: A reappraisal. *The Journal of Social Studies,* No. 19. pp. 76-102.

Islam, N. M. (2011). *An introduction to research methods: A handbook for business and health research (2nd ed.).* Dhaka: Mullick & Brothers.

Islam, N. M. (2011). *An introduction to sample methods: Theory and applications*. Dhaka: Mullick & Brothers.

Islam, R. M. (2012). *Education and economic growth in Bangladesh -An econometric study*. Unpublished M Phil. thesis, Institute of Education and Research, University of Rajshahi.

Islam, R. M. (2015). *Annotated bibliography on economics: Bangladesh studies at home and abroad.* Institute of Bangladesh Studies (IBS), University of Rajshahi.

Islam, T. S., Hossain, A. M. & Qamarullah, T. I. B. (2005). A causality analysis of investment and economic growth in Bangladesh. *Bangladesh Economic Studies*, RURA, Vol. 11, pp. 141-148.

Jackson, N. S., & Markowski, S. (1995). *The attractiveness of countries to foreign direct investment: Implications for the Asia-Pasific Region.* University of South Wales, Canbera. Retrieved from www.kluwerlawonline.com/abstract.php. Cited on 01/08/2015.

Jadhav, P. (2012). Determinants of foreign direct investment in BRICS economies: Analysis of economic, institutional and political factor. *Social and Behavioral Sciences*, Vol. 37, pp. 5-14.

Janicki, H. P., & Wunnava, P. V. (2004). Determinants of foreign direct investment: Empirical evidence from EU accession candidates. *Applied Economics*, Vol. 36, pp. 505-509.

Johansen, S. (1988). Statistical analysis of cointegration vectors. *Journal of Economic Dynamics and Control*, Vol. 12, pp. 231-254.

Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica,* Vol. 59, No. 6, pp. 1551-1580.

Johansen, S. (1995). *Likelihood-based inference in cointegrated vector autoregressive models*. New York, USA: Oxford University Press.

Jordà, Ò. (2005). Estimation and inference of impulse responses. *The American Economic Review*, American Economic Association Vol. 95, No. 1, pp. 161-182.

Joynal, M. A. (03 February, 2014). *Investment in Bangladesh.* Dhaka: The Financial Express, The Press.

Khalid, K. R. Z., Khan, M. M., & Ahmad, M. (2011). Panel data analysis of growth, inequality and poverty: Evidence from SAARC countries. *Journal of Yaşar University*, Vol. 21, No. 6, pp. 3523-3537.

Khan, F. C. (2000). A decade of trade liberalization: How has domestic industry fared in Bangladesh? *Journal of Bangladesh Studies*, Vol. 2.1, No. 4.

Khan, M. A. (1987). The effect of foreign capital inflow on domestic saving and economic growth in Bangladesh: 1972/73 to 1982/83. *Chittagong University Studies*, Vol. 10, No. 1, pp. 180-193.

Kibria, A. (25 February, 2008). *Profit loss.* Dhaka: The Daily Prothom Alo, The Press.

Kim, D. D-K., & Seo, J-S. (2003). Does FDI inflow crowd out domestic investment in Korea? *Journal of Economic Studies*, MCB UP Limited, Vol. 30, No. 6, pp. 605-622.

Kimberly, A. (2014). *Foreign direct investment: Pros, cons and importance.* Retrieved from useconomy.about.com/od/internationalorganizations/p/IMF.htm.Cited on 12/03/2016.

Klein, M., Aaron, C., & Hadjmichael, Bita. (2001). *Foreign direct investment and poverty reduction.* Paper prepared for the OECD Global Forum on International Investment, New Horizons and Policy Challenges for Foreign Direct Investment in the 21st Century, Mexico City. 26-27.

Kneller, R. C., Morgan, W., & Kanchanahatakij, S. (2008). *Trade liberalisation and economic growth.* The World Economy, Journal compilation, Oxford, USA: Blackwell Publishing Ltd.

Kohpaiboon, A. (2004). *Foreign trade regime and FDI-growth nexus: A case study of Thailand.* Working paper, Australian National University.

Kok, R., & Ersoy, Bernur, E. A. (2009). Analyses of FDI determinants, openness and economic growth: The case of Turkey. *Journal of Social Sciences,* FEAS, 51243 Nigde, Turkey, Vol. 5, No. 1, pp. 33-42.

Kormendi, R. C., & Meguire P. G. (1985). Macroeconomic determinants of growth: Cross-country evidence. *Journal of Monetary Economics*. Vol. 16, pp. 141-163.

Kothari, C. R. (2010). *Research methodology: Methods & techniques (*2nd ed.). New Delhi, India: New Age International Publishers Ltd.

Krugman, P. R. (1991). *Rethinking international trade*. Massachusetts, USA: The MIT Press.

Kumar, A. B. (2011). FDI, trade openness, capital formation and economic growth in Bangladesh: A linkage analysis. *International Journal of Business and Management*, Vol. 6, No. 1, pp. 16-28.

Kumar, N. (2002). *Globalization and quality of foreign direct investment*. New Delhi, India: RIS.

Kumar, N., & Pradhan, J. P. (2002). *Foreign direct investment, externalities and economic growth in developing countries: Some empirical explorations and implications for WTO negotiations on investment*. RIS Discussion Papers 27/2002, New Delhi.

Lai, Y. W. (2004). The role of domestic demand in the economic growth in Malaysia: A cointegration analysis. *International Economic Journal*, Vol. 18, No. 3, pp. 337-352.

Lall, S., & Narula, R. (2004). Foreign direct investment and its role in economic development: Do we need a new agenda? *The European Journal of Development Research*, Vol. 16, No. 3, pp. 447-464.

Laura, A., Chanda, A., Sebnem, K-O., & Sayek, S. (2004). FDI and economic growth: The role of local financial markets. *Journal of International Economics*, Vol. 64, No. 1, pp. 89-112.

Levine, R., & Renelt, D. (1992). A sensitivity analysis of cross-country regressions. *The American Economic Review*, Vol. 82, No. 4, pp. 942-963.

Lewer, J. J., & Terry, N. (2003). Capital account and foreign direct investment policies in the late nineties; what effect on trade? *ASEAN Economic Bulletin*, Vol. 20, No. 3, pp. 256-71.

Lim, C., & Maison, A. (2000). *Contribution of private foreign investment in the Malaysian manufacturing sector 1977-1995.*Working Paper, Selangor, Faculty of Economics and Management, Selangor University.

Lim, E-G. (2001). *Determinants of, and the relationship between, foreign direct investment and growth: A summary of the recent literature*. IMF Working Paper WP/01/175, International Monetary Fund, Washington, D. C.

Lind, D. A., Marchal, W. G., & Wathen, A. S. (2010). *Statistical techniques in business and economics*. Irwin, New York: McGraw-Hill.

Lipsey, R. E. (1999). *The role of FDI in international capital flows*. NBER Working Paper, No. 7094.

Liu, X., Burridgez, P., & Sinclair, P. J. N. (2002). Relationships between economic growth, foreign direct investment and trade: evidence from China. *Applied Economics*, University of Birmingham, UK, Vol. 34, pp. 1433-1440.

Liu, X., Shu, C., & Sinclair, P. (2005). *Trade, foreign direct investment and economic growth in Asian economies*. Business School, Loughborough University, Leicestershire, LE11 3TU.

Liu, X., Wang, X. C., & Wei, Y. (2001). Causal links between foreign direct investment and trade in China. *China Economic Review,* Vol. 12, No. 2-3, pp. 190-202.

Liua, X., Bucka, T., & Shu, C. (2005). Chinese economic development, the next stage: Outward FDI? *International Business Review*, Business School, Loughborough, UK, Vol. 14, pp. 97-115.

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, Vol. 22, No. 1, pp. 3-42.

Mackinnon, J. G. (1996). Numerical distribution functions for unit root and cointegration tests. *Journal of Applied Econometrics*, Vol. 11, No. 6, pp. 601-618.

Madala, G. S. (2002). *Introduction to econometrics (3rd ed.).* New York, USA: John Wiley & Sons. Ltd.

Mahmud, W. (1998). *Bangladesh: Structural adjustment and beyond.* Paper presented at the International Conference on Adjustment and Beyond: the Reform Experience in South Asia, jointly organized by the Bangladesh Economic Association and the International Economic Association, Dhaka.

Malek, A. M. (2007). *Export, import and remittance in Bangladesh: A cointegration approach.* Unpublished PhD thesis, Department of Economics, University of Rajshahi.

Mamun, A. A. (2003). Globalization and FDI: Policies, strategies status and challenges for Bangladesh. *BIBM Bulletin*, Vol. 6, No. 1 & 2, pp. 1-4.

Mankiw, N. G., David, R., & David, N. W. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics,* Vol. 57, PP. 407-438.

Mansuri, B. (2005). *The interactive impace of FDI and trade openness on economic growth: Evidence from Morocco.* Working Paper, Presented in 12th Economic Research Forum Conference, Cairo, Egypt.

Martinez, M. J. (2010). *On the dynamics of exports and FDI: The Spanish internationalization process.* Working Paper 2010/10, Research Institute of Applied Economics, Barcelona, Spain.

Matin, K. A. (1987). The effect of foreign capital inflow on domestic saving and economic growth in Bangladesh: 1972/73 to 1982/83. *Chittagong University Studies*, Vol. 10, No. 1, pp. 180-193.

Mcdonald, S., Robinson, S., & Thierfelder, K. (2008). Asian growth and trade poles: India, China, and East and Southeast Asia. *World Development Journal*, US Naval Academy, USA, Vol. 36, No. 2, pp. 210-234.

Meier, G. M., & Baldwin, R. E. (1964). *Economic development: Theory, history, policy.* New York, USA: Jhon Wiley & Sons. Inc.

Metwally, M. M.(2004). Impact of EU-FDI on economic growth in Middle Eastern countries. *European Research Studies,* Vol. 7, No. 1-2.

Mian, E. U., & Alam, Q. (2006). FDI and development: Bangladesh scenario. *Monash Business Review*, Vol. 2, Issue 1.

Miao, W. (2009). Manufacturing FDI and economic growth: Evidence from Asian economies. *Applied Economics*, Vol. 41, No. 8.

Mike, P., & Nikos, C. V. (2004). Institutions, internationalization and FDI: The case of economies in transition. *Transnational Corporations,* Vol. 13, no. 2, pp. 78-94.

Moniruzzaman, M. (2011). *Impacts of trade liberalization on foreign trade in Bangladesh.* Unpublished PhD thesis, Institute of Bangladesh Studies, University of Rajshahi.

Moon, B. E. (1997). *Exports, outward-oriented development and economic growth*. Department of International Relations, Leigh University, USA: Bethlehem, Pa.

Moosa, I. A. (2002). *Foreign direct investment: Theory, evidence and practice.* London: Palgrave.

Moosa, I. A., & Cardak, B. A. (2006). The determinants of foreign direct investment: An extreme bound analysis. *Journal of Multinational Financial Management*, Vol. 16, pp. 199-211.

Morrissey, O., & Andrew, M. (2006). Explaining Africa's export performance-taking a new look. Retrieved from https://www.gtap.agecon.purdue.edu/resources/ download/2643.pdf. Cited on 10/04/2015.

Mortaza M. G., & Narayan, C. D. (2007). *Foreign direct investment, trade liberalization and economic growth: Empirical evidence from South Asia and implications for Bangladesh*. Working Paper Series 0712, Dhaka, Bangladesh: Policy Analysis Unit, Bangladesh Bank.

Nath, H. K. (2009). Trade, foreign direct investment, and growth: Evidence from transition economies. *Comparative Economic Studies*, Vol. 51, No. 1, pp. 20-50.

Nelson, C., & Plosser, C. I. (1982). Trends and random walks in macroeconomic time series. *Journal Monetary Economics,* Vol. 10, pp. 139-162.

Niemi, J. (2001). *The effects of trade liberalization on ASEAN agricultural commodity exports to the EU.* In Proceedings of the 77th European Association of Agricultural Economists Seminar, No. 325 (EAAE '01).

Njong, A. M. (2008). *Investigating the effects of foreign direct investment on export growth in Cameroon.* In Proceedings of the UNECA Ad-hoc Expert Group Meeting Paper, Addis Ababa, Ethiopia.

Noman, A. N. K. (2002). *The impact of foreign trade policies and external shocks on agricultural sector of Bangladesh*. Farming & Rural Systems Economics, Edited by Werner Doppler and Siegfried Bauer, Margraf Verlag, Germany, Vol. 45.

Noorzoy, M. S. (1979). Flows of direct investment and their effects on investment in Canada. *Economic Letters,* Vol. 2, No. 3, pp. 357-361.

Nunnenkamp, P., & Spatz, J. (2004). FDI and economic growth in developing economies: How relevant are host-economy and industry characteristics. *Transnational Corporations,* United Nations, Vol. 13, No. 3.

Obinna, O. E. (1983). *Diversification of Nigeria's external finances through strategic foreign direct investment.* Nigerian Economic Society Annual Conference Proceedings, Jos, 13-16th May.

Onakoya, A. B. (2012). Foreign direct investment and economic growth in Nigeria: A disaggregated sector analysis. *Journal of Economic and Sustainable Development,* Vol. 3, No. 10.

Oseghale, B. D., & Amonkhienan, E. E. (1987). Foreign debt, oil export, direct foreign investment (1960-1984). *The Nigerian Journal of Economic and Social Studies,* Vol. 29, No. 3, pp. 359-380.

Osterwald-Lenun, M. (1992). A note with quantiles of the asymptotic distribution of the ml cointegration rank test statistics. *Oxford Bulletin of Economics and Statistics.* Vol. 54, pp. 461-472.

Papageorgiou, D. (1991). Liberalizing *foreign trade: Lessons of experience in the developing world.* Oxford, UK: Blackwell.

Paugel, A. T. (2007). *International economics.* Irwin, New York, USA: McGraw-Hill.

Paul, B. P. (2011). Revisiting export-led growth for Bangladesh: A synthesis of cointegration and innovation. *International Journal of Economics and Finance,* Canadian Center of Science and Education, Vol. 3, No. 6.

Perkins, D. H., Radelet, S., Sndograss, D. R., Gillis, M., & Roemer, M. (2001). *Economics of development (* 5th ed.). New York, USA: W.W Norton & Company.

Perron, P. (1989). The great crash, the oil price shock and the unit root hypothesis. *Econometrics,* Vol. 47, pp. 1361-1402.

Petri P. A., Plummer, M. G., & Bergstrand, J. H. (1988). *The determinants of foreign direct investment: A survey with applications to the United States.* New York, USA: Cambridge University Press.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika,* Vol. 75, No. 2, pp. 335-346.

Prasanna, N. (2010). Impact of foreign direct investment on export performance in India. *Journal of Social Science,* Vol. 24, No. 1, pp. 65-71.

Qamarullah, T. I. B. (2007). A study of causality between economic growth and private investment in Bangladesh. *Social Science Journal,* University of Rajshahi, Vol. 13.

Quazi, R., & Munir, Q. (2009). Foreign direct investment and investment climate: Comparing Bangladesh with selected countries in South Asia. *Journal of Bangladesh Studies*, Vol. 11.1, No.1.

Rahman, M. M. (2007). The foreign trade of Bangladesh: Its composition, performance, trend, and policy. *Journal of Bangladesh Studies,* Vol. 9.2, No. 3.

Rahman, M. M., & Shahbaz, M. (2011). *Do imports and foreign capital inflows lead economic growth? Cointegration and causality analysis in Pakistan.* COMSATS Institute of Information Technology, Lahore, Pakistan: MPRA Paper No. 29805.

Raihan, M. A. (2009). Foreign direct investment in Bangladesh: Problems and perspects. *ASA University Review,* Vol. 3, No. 2.

Raihan, S. (2008). *Trade liberalization and poverty in Bangladesh.* MARKHUB, Macao Regional Knowledge Hub Working Papers, No. 15, Macao.

Razin, A., Sadka, E., & Yuen, C. (1999). *Excessive FDI under a symmetric information.* NBER Working Paper 7400, Cambridge.

Razzaque, A., & Ahmed, N. (2000). A reexamination of domestic saving-foreign aid relationship in the context of Bangladesh. *The Bangladesh Development Studies*, Vol. 26, No. 4, pp. 1-37.

Reichert, N. U., & Weinhold, D. (2001). Causality test for cross country panels: a new look at FDI and economic growth in developing countries. *Oxford Bulletin of Economics and Statistics*, Vol. 63, No. 2, 153-171.

Reza, S., Rashid, M. A., & Alam, M. (1987). *Private investment in Bangladesh.* Dhaka: The University Press Ltd.

Rodrik, D. (1992). The limits of trade policy reforms in developing countries. *The Journal of Economic Perspectives*, Vol. 6, No. 1, pp. 87-105.

Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy,* Vol. 95, No. 5, pp. 1002-1037.

Romer, P. M. (1994). The origin of endogenous growth. *Journal of Economic Perspectives,* Vol. 8, No. 1, pp. 3-22.

Roy, A. G., & Van den Berg, H. F. (2006). Foreign direct investment and economic growth: A time-series approach. *Global Economy Journal*, Vol. 6, Issue 1.

Sachs, J. D., & Andrew, W. (1995). Economic reform and the process of global integration.*Brookings Paper on Economic Activity,* Vol. 26, No. 1, pp. 1-118.

Sahoo, P. (2006). *Foreign direct investment in South Asia: Policy, trends, impact and determinants*. ADB Institute Discussion Paper 56.

Samuelson, P. A., & Nordhaus, W. D. (2005). *Macroeconomics (18$^{th}$ed.).* Singapore: McGraw- Hill.

Sanjaya, L., & Rajneesh, N. (2004). Foreign direct investment and its role in economic development: Do we need a new agenda? *The European Journal of Development Research*, Vol. 16, No. 3, pp. 447-464.

Santos, P. U. (2000). *Trade liberalization and export performance in selected developing countries.* Studies in Economics 0012, Department of Economics, University of Kent, Canterbury, UK.

Schneider, P. H. (2005). International trade, economic growth and intellectual property rights: A panel data study of developed and developing countries. *Journal of Development Economics*, Vol. 78, pp. 529-547. Retrieved from www.elsevier.com/locate/econbase.Cited on 17/09/2015.

Seddighi, H. R., Lawer, K. A., & Katos, A. V. (2000). *Econometrics: A practical approach.* New York, USA: Routledge.

Shafaeddin, M. (1994). The *impact of trade liberalization on export and GDP in least developed countries*. UNCTAD Discussion Papers 85, UNCTAD, Geneva, Switzerland.

Shafiun, S. N., Abdullah, S. M., & Siddiqua, S. (2009). An examination of FDI and growth nexus in Bangladesh: Engle Granger and Bound testing cointegration approach. *BRAC University Journal*, Vol. V, No. 1, pp. 69-76.

Shahbaz, M. (2012). *Does trade openness affect long run growth? Cointegration, causality and forecast error variance decomposition tests for Pakistan.* MPRA Paper No. 37391, COMSATS Institute of Information of Information Technology, Lahore, Pakistan.

Sharma, R. K. (2000). *Export growth in India: Has FDI played a role?* Economic Growth Center Working Paper 816, Yale University, Connecticut, Conn, USA.

Shujie, Y., & Kailei, W. (2006). *Economic growth in the presence of FDI: The perspective of newly industrializing economies.* Research Paper/33, the Research Paper Series, China and the World Economy, the University of Nottingham.

Siddiqui, S. T. (16 December, 2014). FDIs' *in Bangladesh: Not as bad as suggested but well below the potential*. Dhaka: The Daily Independent, The Press.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica*, Vol. 48, pp. 1-48.

Sjoholm, F. (1999). Technology gap, competition and spillovers from direct foreign investment: Evidence from establishment data. *Journal of Development Studies,* Vol. 36, No. 1, pp. 53-73.

Sobhan, R., & Bhattacharya, D. (1987). External perceptions on private foreign investment policy in Bangladesh. *The Journal of Social Studies*. Vol. 33, pp. l-18.

Soliu, A., & Ali, I. O. (2014). Empirical analysis of trade openness, capital formation, FDI, and economic growth: Nigeria experience. *The International Journal of Social Sciences and Humanities Invention,* Ogun State, Nigeria, Vol. 1, No. 1, pp. 36-50.

Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*. Vol. 70, pp. 65-94.

Soto, M. (2000). *Capital flows and growth in developing countries: Recent empirical evidence.* Capital Movements and Development, OECD Development Centre: Working Paper No. 160.

Srinavasan, T. N., & Bhagwati, J. N. (1999). *Outward-Orientation and development: Are revisionists right?* Center Discussion Paper No. 806, Yale University.

Stern, N. (2002). *The investment climate, governance and inclusion in Bangladesh.* Washington, D.C., USA: World Bank.

Stiglitz, J. E. (2000). Capital market liberalization, economic growth, and instability. *World Development Studies,* the World Bank, Washington, Vol. 28, No. 6, pp. 1075-1086.

Sumei, T., Selvanathan, E. A., & Selvanathan, S. (2008). *Foreign direct investment, domestic investment and economic growth in China.* Research Paper No. 9, United Nations University, World Institute for Development.

Sun, H. (1998). *Macro-economic impact of direct foreign investment in China: 1979-96.* Working Papers, Department of Economics, the University of Sydney, Sydney.

Sundaram, J. K., Schwank, O., & Arnim, V. R. (2011). *Globalization and development in Sub-Sharan Africa.* DESA Working Paper No. 102, on the Conference of Economic and Social Affairs. New York.

Tang, S., Selvanathan, E. A., & Selvanathan S. (2008). *Foreign direct investment, domestic investment, and economic growth in China: A time series analysis.* Research Paper No. 19, UNU-WIDER, United Nations University.

Todaro, M. P., & Smith, S. C. (2008). *Economic development (8th ed.).* Singapore: Pearson Education Inc.

Tsai, P. L. (1994). Determinants of foreign direct investment and its impact on economic growth. *Journal of Economic Development,* Vol. 19, No. 1, pp. 137-163.

Turabian, K. L. (2003). *A manual for writers of research papers, theses, and dissertations (*7th ed.*).* Revised by Wayne, C. B. et al., London, UK: the University of Chicago Press.

Ukpolo, V. (1994). Export composition and growth of selected low-income African countries: Evidence from time-series data. *Applied Economics,* Vol. 26, pp. 445-449.

UNCTAD. (1992). *Transnational corporations as engines of growth*. New York, United States: World Investment Report.

UNCTAD. (2000-2014). *World development report.* USA: UN Publications.

Vernon, R. (1996). International investment and international trade in the product cycle. *Quarterly Journal of Economics,* Vol. 80, pp. 190-207.

UNDP. (2010). *Human development report. United Nations Development Program,* USA: UN Publications.

Wadud, A. M. (2005). Are saving and investment cointegrated? A VAR approach to assess capital mobility in Japan. *Bangladesh Economic Studies*, RUEA, Vol. 11, pp. 174-181.

Wang, M. (2009). Manufacturing FDI and economic growth: Evidence from Asian economies. *Applied Economics,* Marquette University, Vol. 41, No. 8.

WDI. (1992-2014). World Development Indicators. The Data Base of World Bank.

Weiss, J. (1992). Export response to trade reform: Recent Mexican experience. *Development Policy Review*, Vol. 10, No. 1, pp. 43-60.

WEO. (2014). World Economic Outlook. A Publication of International Monetary Fund (IMF).

Wong, H. T. (2008). Exports and domestic demand: Some empirical evidence in ASEAN 5. *Labuan Bulletin of International Business and Finance*, Vol. 6, pp. 39-55.

Wong, K. N., & Tang, T. C. (2007). *Exchange rate variability and the export demand for Malaysia's semiconductors: An empirical study*. Monash University Discussion Paper 13/07.

World Bank. (1999). *Foreign Direct Investment in Bangladesh: Issues of Long-run Sustainability,* Dhaka.

Xing, Y. (2006). Why is China so attractive for FDI? The role of exchange rates. *China Economic Review*, Vol. 17, No. 2, pp. 198-209.

Xu, B. (2000). Multinational enterprises, technology diffusion, and host country productivity growth. *Journal of Development Economics*, University of Florida, Vol. 62, p. 477-493.

Xuan, N. T., & Xing, Y. (2008). Foreign direct investment and exports: The experiences of Vietnam. *Economics of Transition*, Vol. 16, No. 2, pp. 183-197.

Yanikkaya, H. (2003). Trade openness and economic growth: A cross-country empirical investigation. *Journal of Development Economics*, Vol. 72, No. 1, pp. 57-89.

Yanrui, W. (2000). Measuring the performance of foreign direct investment: A case study of China. *Economics Letters,* University of Western Australia, Vol. 66, No. 2, pp. 143-150.

Yao, S. (2006). On economic growth, FDI and exports in China. *Applied Economics*, Hendon, London, UK, Vol. 38, pp. 339-351.

Yucel, F. (2009). Causal relationships between financial development, trade openness and economic growth: The case of Turkey. *Journal of Social Sciences*, FEAS, 41243 Nudge, Turkey, Vol. 5, No. 1, pp. 33-42.

Yusop, Z. (1992). *Factors influencing foreign direct investment in the manufacturing sector of Malaysia*. Masters Thesis, University Partanian, Malaysia. Retrieved from pasir.upm.edu.my/8039/.Cited on 01/11/2015.

Zambe B, N. S., & Yaoxing, Y. (2010). The relationship between foreign direct investment, trade openness and growth in Cote d'Ivoire. *International Journal of Business and Management*, Canadian Center of Science and Education, Vol. 5, No. 7.

Zhang, K. H. (2001). Does foreign direct investment promote economic growth? Evidence from East Asia and Latin America. *Journal of Western Economic Association*, Vol. 13, No. 2, p. 175-185.