

The Impact of key Macroeconomic factors on Economic Growth of Bangladesh: A VAR Co-integration Analysis

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Abstract- *This study analyzes the impact of key macroeconomic factors on economic growth of Bangladesh from the period of 1988 to 2012. The key macroeconomic factors studied are market capitalization, foreign direct investment and real interest rate. This study also examines the long run and short run relationship between the economic growth and capital market, foreign direct investment, and real interest rate by using vector autoregressive (VAR) model. The VAR results suggest that the market capitalization, foreign direct investment and real interest rate have impact on economic growth in the long run, but in short run it does not have any predictable behavior. The variance decomposition results also conclude the same result as VAR model. All variables have the long run effects on economic growth but it does not have in short run, and the effects increases with time. Based on the finding, this study suggests that the government should come out with the appropriate macroeconomic plan and policy to draw more inward foreign direct investment, increase market capitalization and stabilize real interest rate in order to faster the economic growth in future. As finding of this study shows that these factors do not have significant impact on economic growth in Bangladesh in the short run.*

Keywords- Economic Growth; Macroeconomics factors; Cointegration; Bangladesh

1. INTRODUCTION

Sustainable economic growth is a major goal of every country in the world as it measures the country overall economic development. It brings a better standard of living for community (Suliman & Osman, 1994).[26] There are many factors which contribute simultaneously to maintain sustainable economic growth of a nation. Therefore, the measurement of economic growth of a particular country is complex as so many determinants of growth are contributed simultaneously to gross domestic products (GDP). For that reason, this study will particularly investigate the impact of capital market, real interest rate and foreign direct investment on economic growth and to examine their contribution toward economic development of Bangladesh. This is because capital market plays a significance role as an intermediary for developing and developed countries economy by providing long term capital. A particular country's capital market consists of financial institutions, insurance companies and stock market that channel the long term capital financing from surplus of fund to demander of fund. It also helps to channel and mobilize funds to government, enterprise, individual and works as most constructive source of investment in the economy. Besides, it is also considered one of the vital factor for promoting and maintaining economic growth of a country.

On the other hand, foreign direct investment is considered one of the significant tools few contributing to economic

growth in the case of developing countries and some economists argue that countries which are focusing on outward development strategy have greater chance to foster higher economic growth compare with countries whose focus on internally (Sethi and Sucharita, 2009).[25] According to De Mello (1999)[8] the enormous effect of FDI on economic growth is probably contributed by the capital accumulation, transfer of new technology to the recipient countries and augmented stock of knowledge of the recipient countries.

However, many of the policy makers and researchers have examined that the short and long run interest rate yield may predict the trend of the future economic growth. Future trend of economic activity is important for businessmen, policy makers, consumers and market analysts. Hence, with correct information about the future market, policy makers can suggest the better policy, consumers can decide whether to consume now or later, business man can decide whether to invest now or in future. For instance, if the consumers feel that they can increase consumption at future than current levels due to goods and services are expensive then it will increase the interest rate. On the other hand, if the consumer increases the consumption at current levels rather than future then it will decrease the interest rate. In the same context, if the economic growth increases in future then interest rate spread will be lower. If economic growth decreases then opposite will happen. Thus, the effect of interest rate on

economic growth is inevitable. Therefore, the main objective of this paper is to provide an empirical evidence of the impact of Bangladesh's capital market, foreign direct investment and real interest rate on economic growth.

The rest of this paper is organized as follows: the next section discusses the literature review of capital market, foreign direct investment, and real interest rate on economic growth. Section 3 present the methodology and data source of the study. Section 4 analysis's the finding of the study and Section 5 concludes.

2. LITERATURE REVIEW

2.1 Capital market and Economic growth

One of the most important ingredients of economic growth is capital which is basically facilitated by capital market. Although, there has been debate in economic literature with respect to the link between capital market and economic growth but based on many researchers, causal relationship exist between capital market and economic development. Liu and Hsu (2006)[18], Ake and Ognaligui (2010)[1] emphasized that the effect of stock market on economic growth is positive. In the same context, Carlin and Mayer (2003)[5], Garretsen et al. (2004)[11] found that there is causal relation between the financial system and economic development. In addition, tachiwou (2010)[27] found that there is positive correlation between capital market and economic development in West African monetary union in the long and short run.

On the other hand, Naceur and Ghazouani (2007)[22] argued based on their study on 11 MENA regions countries that the causal relation between the financial and economic development would be negative if financial system of the particular country is not well developed. They stress out to build the reliable financial system to experience the economic growth of the country. Hondroyannis, et al. (2005)[15] found by conducting study in Greece that the relationship between capital market and economic growth are bi-directional in the long run even though both stock market and banks can endorse economic growth but their effects are small. Ergungor (2008) stated that countries which follow inflexible judicial system have significance effect on economic growth by banking sector where in the flexible judicial system capital market has strong effect on economic growth. Therefore, an efficient financial system of a country is mandatory in order to stimulate the economic development. Moreover, the impact of well efficient financial system on sustainable economic development is unavoidable.

2.2 FDI and Economic Growth.

However, Alfaro et al. (2004)[2] conducted a study to examine countries which has better financial system can utilize FDI more efficiently or not based on empirical cross country data from 1975 to 1995. Their empirical result showed that foreign direct investment plays significant role in fostering the economic growth. They also emphasized

that countries which has well developed financial market they can gain economic growth faster compare with the country which do not have. Guech and Moolio (2013)[12] carried out a research to investigate the relationship between foreign direct investment and economic growth in Cambodia. The main purpose of conducting this research was to scrutinize the effect of FDI on economic growth. This is because, in Cambodia, the rate of gross domestic product (GDP) was average 7% due to inflows of foreign direct investment for the period of 1993 to 2011. Therefore, this average economic growth rate of Cambodia drives the authors' mind to examine whether foreign direct investment took the lead of economic growth of Cambodia or not. By using numerous Econometric tests the authors found that there is long run positive correlation between the economic growth and foreign direct investment of Cambodia. They further argue that foreign direct investment help to create employment opportunities for local people with poverty reduction in Cambodia. Vijayakumar et al. (2009)[29] conducted a study on BRICS countries to scrutinize the relationship between economic growth and foreign direct investment by using quarterly data set for different phase of each BRICS countries. Besides, the authors use ADF test for checking stationary and johansen-cointegration test for checking the long run relation between the FDI and economic growth. However, VECM test result shows that economic Growth guides foreign direct investment bi-directionally for Brazil, Russia and South Africa and foreign direct investment guide growth unidirectional for India and China respectively.

In addition, Miankhel et al. (2009)[19] took on similar study like previous one on six emerging economy countries like India, Pakistan, Mexico, Malaysia, Chile, and Thailand to investigate the vibrant relationship of economic growth and foreign direct investment. The result shows that economic growth precedes foreign direct investment in the long run with respect to India. While there is bi-directional relation between economic growth and foreign direct investment in Thailand. This means that further inflow of FDI speed up the GDP growth. But in case of Malaysia, there is no relationship between foreign direct investment and economic growth. Hence, right after the East Asian financial crisis in 1997 the relation between the economic growth and foreign direct investment has gained attention among the policy maker, economists and researchers. The reason for attention towards FDI is that the short run capital flow is highly volatile. Therefore, developing countries are focusing more on long term capital flow rather than short run capital flow. However, sometimes the impact of long term investments is not clear on economic growth. The FDI in not attracted uniformly by each country. The study conducted by Miankhel et al (2009)[19] in emerging countries, we have seen that some countries GDP growth leads to the FDI inflows and vice-versa.

2.3 Interest Rate and Economic Growth.

Moreover, according to Harvey (1988)[14] said that real interest rate predicts the future consumption. Udoka et al. (2012)[28] did a study on Nigeria to investigate the effect of interest rate fluctuation on economic development. The empirical result of the study reveals that the inverse relationship exists between the economic development and interest rate in Nigeria. It means when interest rate increases, it decreases the Nigerian GDP growth. Hence, D'adda and Scorcu (1997)[7] did a study on the 20 industrialized countries to scrutinize relationship between real interest rate and economic development from 1965 to 1994. The empirical result of the last 30 years data shows that if the real interest rate is increase by 1% then economic growth decreases by 1/5 rate. The authors further argue that long term increase in the real interest rate effects become more severe in economic growth in recent years and the study result also shows that positive relation exists between the economic development and capital accumulation, and negative relationship exists between the real interest rate and economic growth. In the same context, Saymeh and Orabi (2013)[24] carried out a study on Jordan to examine the impact of interest rate and inflation on real economic growth from the period of 2000 to 2010. Their empirical result shows that interest rate has influence on the economic growth.

However, Anaripour (2011)[3] did a study on Iran to explore the relation between the interest rate and economic growth from the period of 2004 to 2010. The empirical result of the study shows that there is negative relationship between interest rate and economic growth. The study result indicates that causal relation which exists between interest rate and economic growth is unilateral. Therefore, it does not matter whether interest rate increases or decreases to the economic growth. In the same context, Hansen and Seshadri (2013)[13] did a study to investigate the relation between productivity growth and interest rate. Their study found that there is inverse relation between the interest rate and productivity growth. Because, when interest rate is low in the long run it shows that productivity growth is high. Besides, when the interest rate is high in the long run, the productivity growth rate is low. There is a two-way relation between productivity growth and interest rate. Therefore, interest rate is said to be one of the significant determinants of economic development for a country. It is also regarded as vital variable of policymakers in macroeconomics. This is because, change in the interest rate not only affect the economic agent but also overall country economic growth. Most of the economists believe that there is positive relation between economic growth, capital accumulation and negative relation between capital accumulation and capital cost. However, Chang et al. (2010)[6] did a study on Japan to investigate whether real interest rate has impact on the Japanese economy and finance or not. The empirical result of the study showed that lower interest rate has impact on the banking industry to contribute to the Japanese economic growth.

Hence, Nakaota (2005)[23] did a study on Japan to scrutinize the effect of term structure of interest rate on future economic activity. He also examines whether the nature of this relationship change with the time or not. The empirical results of this study found that there is breaking point among the interest rate and economic growth. Firstly, result shows that the relation among the future economic movement and yields spreads change over time. Secondly, yield spreads has more information regarding future economic activity compare with the other variables.

3. RESEARCH METHOD AND DATA SOURCE

This study is conducted based on the secondary data. The source of data is from the World Bank development indicator website and United Nations conference on trade and development (UNCTAD). This study uses annual times series data cover the period from 1988 to 2012 in Bangladesh on Real Gross Domestic product, Market Capitalization of listed companies (percentage of GDP), Foreign Direct Investment (percentage of GDP) and Real Interest rate. Real Gross Domestic Product is used as a proxy for economic growth. However, Market capitalization of listed companies is used to measure the role of Bangladesh capital market on economic growth. Besides, this study is also used foreign direct investment and real interest rate as to examine their impact on Bangladesh's economic growth. All data on Real Gross Domestic product is converted in natural logarithm except for Market Capitalization, foreign direct investment, real interest rate before any econometrics test performed. Lastly, different econometric tools used in this study are unit root test, Johansen cointegration test and Vector Autoregression (VAR) model to estimate the possible cointegration among dependent and explanatory variables.

4. ANALYSIS OF RESULTS

4.1 Unit Root Test Result

Unit root test is conducted for the full sample period with one year lag in order to determine the stationarity characteristics of the individual variable.

Table 1: Unit Root Test Result

Variable	Augmented Dickey-Fuller Test	
	P-Value at level	P-Value at First Difference
Log of Real GDP (RGDPt)	0.5888 (1.926085)	0.0591* (1.642670)
Market Capitalization(MCapt)	0.5744 (1.945966)	0.0043* (2.034699)
FDI inflow (FDIt)	0.1315 (2.096981)	0.0382* (2.005227)
Real Interest Rate (RI _t)	0.2605 (2.041800)	0.0564* (1.997669)

* Stationary a at 10% significance level Durbin-Watson stat in parentheses

Table 1 shows the result of unit root test at level and first difference by using Augmented Dickey-Fuller (ADF) tests by including a trend and a constant, the null hypothesis of a unit root cannot be rejected at the 10 percent ($\alpha = 0.10$) significance level for any variable. The values of Durbin-Watson statistics shows that all variables are close to two, therefore there is no autocorrelation problem. The result suggests that the macroeconomic variables have a stochastic trend. Since no variable is stationary and has a unit root at the 10 percent significance level, the next step is to test the variables for second unit root by conducting the first difference unit root test.

The results of first difference unit root test suggest that, reject the null hypothesis for all variables; all variables are stationary at 10 percent significance level. The values of

Durbin-Watson result for all variables are now close to two except for RGDP. Therefore there might be a positive autocorrelation problem with RGDP.

4.2 Johansen Cointegration Test

In order to determine the correct method of regression, it is important to run the Johansen cointegration test. The result of Johansen cointegration test will determine whether unrestricted VAR or vector error correction should be used. The Johansen cointegration test of RGDP, MCAP, FDI and RI are undertaken with the condition on the hypothesis of a unit root. The result of the Johansen cointegration test is shown in the **Table 2**. The result suggests that there is no cointegration between RGDP, MCAP, FDI and RI.

Table 2: Johansen Cointegration Test for RGDP, MCAP, FDI and RI

Unrestricted Cointegration Rank Test (Trace)				Hypothesized Number of Cointegrating Equation
Eigenvalue	Trace Statistic	5% Critical Value	Probability	
0.572337	41.83495	47.85613	0.5154	None
0.465432	22.29831	29.79707	0.5821	At Most 1
0.272962	7.893512	15.49471	0.5372	At Most 2
0.024123	0.561639	3.841466	0.4089	At Most 3
Trace test indicates no cointegration at the 0.05 level				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				Hypothesized Number of Cointegrating Equation
Eigenvalue	Max-Eigenvalue Statistic	5% Critical Value	Probability	
0.098504	19.53665	27.58434	0.3741	None
0.065498	14.40480	21.13162	0.3327	At Most 1
0.042382	7.331873	14.26460	0.4507	At Most 2
0.004419	0.561639	3.841466	0.4536	At Most 3

Max-eigenvalue test indicates no cointegration at the 0.05 level

Since both test results trace statistic and maximum eigenvalue statistic indicates that there is no cointegration or long run relationship between RGDP, MCAP, FDI and RI at 5 percent level of significance, null hypothesis of no cointegration cannot be rejected at 5 percent level where 1 lag interval is used in this test.

Meanwhile, variables point out that there is a relationship between RGDP, MCAP, FDI and RI because variables are non-stationary at level and not cointegrated. Since there is no cointegration, unrestricted VAR is the appropriate method for this study.

4.3 Vector Autoregression Estimates

Unrestricted VAR in level has been performed to understand the effects and relationships. In the vector

autoregression estimates, three lags have been used with a constant for each variable. Table 3 shows the regression result of the model. The high values of R-squared suggest that the fit is good for each variable of the model. The F-statistic is very high for each variable of the model which means it is a good fitted model and independent variables of each model explains the variation of dependent variable. In addition, RGDP increases the further effects of MCAP, FDI and RI; because the estimated coefficients are statistically significant at 10 percent confidence level at third lag. However, for fast and second lag estimated coefficients are statistically insignificant despite the values of R-squared and adjusted R-squared being high. The long run consistency between dependent variable and independent variables continues, since the effect exist only

in the third lag. Therefore, the VAR model suggests that 99.50 percent of the variation of RGDP is explained by independent variables in the long run.

Table 3: Vector Autoregression Estimates of RGDP, MCAP, FDI and RI

	RGDP
RGDP(-1)	0.641617 (1.42801)
RGDP(-2)	0.068794 (0.13013)
RGDP(-3)	0.159324 (0.40922)
MCAP(-1)	-0.003994 (-0.58678)
MCAP(-2)	0.005927 (0.61885)
MCAP(-3)	0.027323 (2.00752)
FDI(-1)	0.047308 (0.58603)
FDI(-2)	-0.057362 (-0.62066)
FDI(-3)	0.100769 (1.33231)
RI(-1)	-0.005088 (-0.77813)
RI(-2)	0.001736 (0.27332)
RI(-3)	0.017582 (2.57549)
C	3.049282 (1.29316)
R-squared	0.994967
Adj. R-squared	0.988256
F-statistic	148.2679

t-statistics in parentheses

4.4 Variance Decomposition for the VAR Models

Table 4 shows the variance decomposition results for the VAR model for 10 years ahead. Variance decomposition of RGDP shows that MCAP does not have effect in short run, but in long run MCAP affects RGDP. This result is similar with the study done by Hondroyannis et al. (2005)[15], Calderón, and Liu (2003)[4], Minier (2003)[20]. Where, Minier (2003)[20] said that economic

growth and financial development are positively correlated if particular countries market capitalization is high. He further argued that this positive correlation between economic growth and financial development will not work if particular country has low level of market capitalization. Calderón, and Liu (2003)[4] in developing and develop countries, suggest that Financial maturity boost economic development in all countries. On the other hand, Hondroyannis et al. (2005)[15] have done a study on Greece to examine the relation between the financial market and economic development. Their empirical results found by using error correction model (ECM) that stock market capitalization has effect on the economic activity in long run. They also added that magnitude of these effects is small because it partially determines the real economic activity. At the fourth period, 26.06 percent of the variance in RGDP is accounted for by MCAP and it increased to 36.53 percent at the fifth period. Gradually, the effect decreases to 25.88 percent at tenth period.

Moreover, FDI also does not have any predictive information in short run. However, it has long run effects on RGDP. Kogid et al. (2011)[17] argued by using Johansen and VECM model that there is long run cointegration between FDI and economic development in Malaysia and Foreign direct investment does influence the economic development in the long run. Hooi and Wah (2010) found similar results like Kogid (2011)[17] that foreign direct investment has long run impact on economic growth. Mun et al. (2009)[21] also found that FDI has significant relation towards the growth in the long run. On the other hand, Karimi and Yusop (2009)[16] stated that there is no long run and bio-directional relationship between the FDI and Economic development in Malaysia. They also said that FDI has indirect effect on economic growth in Malaysia. In the same context, Duasa (2007)[9] found by using the Generalized Autoregressive conditional Heteroskedasticity model (GARCH) that there is no causal relation between foreign direct investment and economic development in Malaysia. This indicates that foreign direct investment does not have any effect on economic growth in the long run. However, at the fourth period, 7.17 percent of the variance in RGDP is explained by FDI and it increased to 29.25 percent at the tenth period. The RI has much faster affect RGDP compare to other variables.

At the second period 2.61 percent of the variance in RGDP is explained by RI and the effect gradually increases in long run. This result is also similar to the studies done by Anaripour (2011)[3], D'adda and Scorcu, (1997)[7], Udoka and Anyingang (2012)[28] have done a study in Nigeria to examine the effect of interest rate fluctuation on economic growth. Their empirical results suggest that there is inverse relationship between interest rate fluctuation and economic growth. This means when interest rate is increase economic growth will decrease. This result is consistent with the research result which has got for this study. D'adda and Scorcu, (1997)[7] found that negative relationship exists between the real interest rate and economic growth in industrialized country. The authors

further added that if real interest rate is increased by 1% then it will reduce economic growth by 1/5 percentage in long run. Anaripour (2011)[3] did a study on Iran to examine the relation between the interest rate and economic growth. The author empirical results found that negative relation exist between interest rate and economic growth. He further added that unilateral relations exist between economic growth and interest rate. It means that increase and decrease of interest rate do not affect the economic growth.

Table 4: Variance Decomposition of RGDP for the VAR Models

Period	S.E.	MCAP	FDI	RI
1	0.048415	0.000000	0.000000	0.000000
2	0.067716	1.532221	0.587616	2.612442
3	0.075953	2.300959	0.467097	2.888202
4	0.102725	26.05867	7.169845	13.96828
5	0.143028	36.53358	11.09617	24.71005
6	0.161676	32.20917	15.06123	29.90741
7	0.180762	29.41985	18.70368	31.96995
8	0.222189	31.55699	21.73191	32.76786
9	0.257857	29.45945	25.55385	33.71214
10	0.281495	25.88169	29.24677	34.08024

Four variables VAR model was estimated; RGDP, MCAP, FDI and RI. The VAR results suggest that the independent variables behave in a predictable way in long run, but in short run it does not have any predictable behaviors. The variance decomposition results conclude the same result as VAR model. All variables have the long run effects on RGDP but not in short run; and the effects increases with time.

5. CONCLUSION

The main objective of this paper is to provide an empirical evidence of the impact of Bangladesh's capital market, foreign direct investment and real interest rate on economic growth from the period of 1988 to 2012. This is because, capital market provides long term capital financing such as bonds, securities and selling of shares play a major role to bring country economic and financial development. Besides, capital market acts as an intermediary of financial institution in mobilizing the funds from surplus units to the deficit units. Therefore, the significance of well-established capital market in order to faster country economic development is unavoidable and if a country has higher capital accumulation, the faster would be the country economic development. However, the authors have chosen foreign direct investment and real interest rate among other macroeconomic determinants to examine their impact towards economic development in

case of Bangladesh. Some economists argue that countries which are focusing on outward development strategy have greater chance to foster higher economic growth compare with countries which focus on internally (Sethi and Sucharita, 2009)[25]. On the other hand, many of the policy makers and researchers have examined that the short and long run interest rate yield may predict the trend of the future economic growth.

However, the VAR results imply that the independent variables behave in a predictable way in long run, but in short run it does not have any predictable behavior. The variance decomposition results also conclude the same result as VAR model. All variables have the long run effects on economic growth but not in short run, and the effects increases with time. Based on the finding, this study suggests that the government should come out with the appropriate macroeconomic plan and policy to draw more inward foreign direct investment, increase market capitalization and stabilize real interest rate in order to faster the economic growth in future in the short run.

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