

# Effect of Macro Economic Variables on Stock Market Returns- Bangladesh Context

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## Abstract

*This study explores the relationship among macroeconomic variables and stock market returns in case of Dhaka Stock Market. Macro-economic variables (money supply, interest rate, exchange rate, GDP growth rate and inflation) have taken as independent variable and Stock Market return as dependent variable. The study period was 2001 to 2010. A simple regression analysis is performed to reach the conclusion. The study found that there is no relation between macro-economic variables and Stock Market return. It implies that Stock Market return is not sensitive to changes in the macroeconomic variables.*

**Key Words:** Stock Market Return, Macro Economic Variables, GDP.

## 1.0 Introduction

Many studies performed in the developed countries regarding the relationship between macroeconomic variables and the stock market returns have been documented over the last couple of decades. Starting with Fama [1] and contributed by Lee [2], Kaneko et al. [3] Mukherjee et al. [4], Booth et al. [5], Mavrides [6], Maysami et al. [7], Sadorsky [8], and Chen [9]. For studies in the developing countries, Ibrahim et al. [10,11] Chen et al. [12], and Janor et al. [13] test the factors of the stock returns using macro-economic variables. Last but not least, by knowing which macroeconomic variables affect the stock market the most, both the personal and corporate investors would be able to proactively strategize their investments according to the change of the monetary policy.

The Dhaka stock market is of special interest as its unique features may trigger a different pattern of stock price movement either from the developed or other emerging economies. From the microeconomic perspective, the Market Efficiency Hypothesis (MEH) and dividend policy are the main issues that distinguish the Malaysian stock market behavior from other countries. For market efficiency hypothesis, Neoh [14], concludes that the U.S stock market is more efficient than the Malaysian. His efficiency measure is based on the fundamental factor of asset pricing. As the U.S firms only takes into account the factors of true value in pricing their stocks, the Malaysian firms includes other non-fundamental factors like bonus issues, etc. Besides, most of the developed markets, the



Malaysian stock market seems to be in the weak form of efficiency in the sense that it does not follow the random walk theory [15-19]. In terms of the dividend policy, an earlier study by Mansor et al. [20] find that the Malaysian market responds to the dividend announcement, but such effect does not hold in a latter study by Yong et al. [21]. This suggests that the dividend signaling effect for the Malaysian stock market is sensitive to a different economic cycle. Unlike Malaysia, the dividend signaling model holds for almost all developed countries [22-28]. From the macroeconomic perspective, studying the interaction of macroeconomic variables and the Malaysian stock market index is our primary interest because of three reasons; i.) Malaysia pursues a trade-led approach to stimulate its economy. ii.) Its equity market development is considered rapidly growing one standard measure of the level of equity market development is the market capitalization to GDP ratio. According to the World Bank, the market capitalization to GDP ratio in 1990 (2000) for Malaysia is 110.4% (127.0%); for Singapore is 93% (165.6%); and for Japan is 96.1% (68.2%) Taken from Pan et al. [30] iii.) Unlike developed countries, Malaysia does not adopt a freely exchange rate system and has more capital control [28]. Against these differences, studying the Malaysian context is important in order to provide a deeper understanding of this subject in enhancing a better decision making for the monetary policy. In terms of the research methodology, we adopt the Vector Autoregressive (VAR) framework by initially looking at the long run and short run relationship between stock market and the macroeconomic variables via the co-integration technique, followed by the Variance Decomposition analysis and Impulse Response Function. The establishment of co-integration analysis has offered an empirical approach in analyzing the relationship between macroeconomic variables and the stock market.

The present study reveals individual and combine effect of macro-economic variables of Dhaka Stock Exchange market from 2001 to 2010.

## **2.0 Review of literature**

There are many researches are done all over the world regarding stock market return. This gives rise to development of international APT. Since then, many studies have looked into the 'exchange rate channel' of monetary policy transmission. Bracker et al. [29], found that macroeconomic variables were significantly influenced by the extent of international stock market integration. As a company's growth depends on domestic macroeconomic condition as well as its major trading partners, the co-movement of macroeconomic variables across countries may influence the movement of stock prices in those countries. Consequently, apart from the traditional variables namely money supply, interest rate, inflation, and reserves, the exchange rate is also one of the macroeconomic factors that could influence stock prices especially in the developed countries.



Previous studies on the macroeconomic determinants of stock returns can be divided into two major categories. The first category is the study to determine the factors affecting stock prices such as Sadorsky [8], Chen [9], Mavrides [6] and Lee [2]. The second category is to examine factors determining stock return volatility such as in Beltratti et al. [31], and Schwert [32]. Both groups are different in terms of the research objectives, methodologies, and most importantly the implications of their findings can lead to different inferences. The former focuses on the stock return, which can be measured by the return on the market indices, sectoral indices or individual stocks. On the other hand, the latter is concerned with the volatility of the stock itself, which can be measured via autoregressive conditional heteroscedasticity (ARCH) model. Since our study falls under the first group, the following reviews of literature center on the dynamic interaction between macroeconomic variables and the stock returns. Schwert [32], Koutoulas et al. [33], and Maysami et al. [7] show that changes in the macroeconomic variables can predict the stock market movements for the case of the US.

Singapore, and Canada, it can be inferred that the significant influence of the macroeconomic variables on the stock market index is rather empirically proven for the developed countries. Nonetheless, the empirical finding for the case of the developing economies is still a puzzle. Although the existence of a unidirectional causality from economic activities to stock market, there are also a substantial number of studies that show a significant relationship, running from stock market to economic variables. Among others, Fama [1], Kaneko et al. [3], and Janor et al. [13] offer evidence on this issue for the case of the U.S., Japanese and Malaysian stock markets, respectively. However, studies on the European market by Poon et al. [34] and Gjerde et al. [35] reveal insignificant relationships between stock market and macroeconomic variables, be it from stock market to economic activities and vice versa.

Hence, three conclusions can be made. First, changes in the share prices are affected by the changes in macroeconomic performance in the well-developed markets, but results are inconclusive for the emerging markets. Secondly, the predictive role of stock market on macroeconomic activities is inconclusive for both the developed and emerging markets. Thirdly, whether there is a unidirectional or bidirectional relationship between macroeconomic performance and stock market returns for both developed and developing economies is still subject to further research. While the association between stock market and economic activities is quite obvious regardless of its causality direction, a standardized set of macroeconomic variables is not found. Macroeconomic variables selected to examine the determinants of stock market tend to differ slightly across studies. Nevertheless, in general, Ibrahim et al. [11], Booth et al. [5], Wongbangpo et al. [36], Chen [9], Chen et al. [12].



Maysami et al. [7], and Mukherjee et al. [4] reveal that the rate of inflation, money growth, interest rates, industrial production, reserves, and exchange rates are the most popular significant factors in explaining the stock market movement. Mukherjee et al. [4] who propose that changes in both short and long-term rates are expected to affect the discount rate in the similar way. Another monetary policy tool is money supply. How the money supply affects the stock market returns is also a matter of empirical proof. According to conventional economic theory by Fama [1], an increase in money supply leads to an increase in discount rates which in turn, lowers the price of stock, thus conferring a negative effect. However, Mukherjee et al. [4] argue that if an increase in money supply leads to economic expansion via increased cash flows, stock prices would benefit from economic growth lead by such expansionary monetary policy. In the case of Japan, the study shows that money supply is positively related to stock market. Consistently, Maysami et al. [7] support the view of Mukherjee et al. [4] for both long run and short run dynamic interaction between money supply and stock returns for the case of Singapore. Besides interest rate and money supply, inflation can also affect the movement of stock prices.

Theoretically, Aspren [37] put forward that inflation should be positively related to stock return if stocks provide a hedge against inflation. However, empirical studies by Barrows et al. [38], and Chen et al. [12] conclude that inflation has negative effects on the stock market. Under normal circumstances, a rise in expected inflation rate tends to lead to restrictive monetary policies, which would have a negative effect upon stock prices. Nonetheless, as price stability is one of the macroeconomic policy objectives by the Malaysian government and also an expected target of the Malaysian citizens, we believe that the relationship between inflation and stock price is insignificant. Another variable of interest is the exchange rates. Based on 'exchange rate channel' of monetary policy transmission as in Pan et al. [30], a depreciation of the local currency makes exporting goods less expensive and may lead to an increase in foreign demand and sales for the exporting firms. As a result, the value of exporting (importing) firms would increase (decrease). This, however, is only true if the demand for exports and imports are elastic. If the demand for imports is inelastic, the benefit of increased exports would be absorbed by higher prices paid for imports, thus undermining the advantages of depreciation. The 'exchange rate channel' by Pan et al. [30], is consistent with the 'flow oriented' exchange rate model, introduced by Dornbusch et al. [39]. They affirm that exchange rate movements initially affect the international competitiveness and trade position, followed by the real output of the country, and finally affects the current and future cash flows of companies, which can be inferred from the stock price movements. In short, both exchange rate channel and flow oriented model hypothesize that an



appreciation (depreciation) of a local currency leads to a decrease (increase) in the firm value of exporting firms, and vice versa for the importing firms. Even if a firm does not directly involve in the export import business, Adler et al. [40] show domestic firms that have minimal international activities can still be affected by the exchange rate movements if their input prices, output prices, or product demand depends on the fluctuation of exchange rate. To summarize, the impact of exchange rate on stock price depends on the importance of a nation's international trade in its economy as well as the degree of the trade balance. Empirical studies on the stock market-exchange rate nexus show mixed results. Aggrawal [41] find that exchange rates have positive effects on the stock market. In contrast, Soenen et al. [42] discover an inverse relationship. Using three different exchange rate measures namely real effective exchange rate, nominal effective exchange rate and RM/US\$, Ibrahim [10] suggests no long run relationship between stock market and exchange rates in a bi-variate setting for the Malaysian case. However, by including money supply and reserves, he finds some evidence of the long run relationship among the four variables (stock market index, exchange rate, money supply and reserves). His findings also indicate that changes in money supply and reserves affect the stock market index in the short run. Our study differs from him in at least two aspects. First, as his aim is to investigate the dynamic interaction between exchange rate and stock market, ours is to examine the factors of stock market returns. As a result, different theories and variables are involved along the process. Secondly, our study incorporates the data for Dhaka Stock Market, which comprises before and after crisis period. Other than the policy monetary tools mentioned above, the level of real economic activity is also crucial in determining the stock market returns. The most popular measure of real economic activity is the gross domestic product Rahman et al.

The researchers have made an effort to investigate whether the variables (i.e. interest rate, inflation, exchange rate, GDP growth rate) can make a significant effect on stock volatility when they are considering individually as well as combined.

### **3.0 Objectives of the study**

The study is performed to investigate

- The effect of individual macro-economic variable on stock market return.
- The combined relationship among interest rate, inflation, exchange rate, GDP growth rate.

### **4.0 Methodology**

Secondary data sources have been used in this study.



#### 4.1 Sampling design

The following specific judgment has been followed for selecting the sample size.

- The index has been collected from DSE market.
- DSE has different types of indexes such as DSE-20 index, all share price index, general index etc. We have considered only general price index.
- The interest rate is taken weighted average interest rate calculated by Bangladesh Bank.
- The exchange rate has considered only conversion rate between US Dollar and Taka.
- Only national inflation rate has considered for study purpose.
- Bond trading is excluded from the study.

#### 4.2 Study period

The study period is 10 years starting from 2001 to 2010.

#### 4.3 Data collection

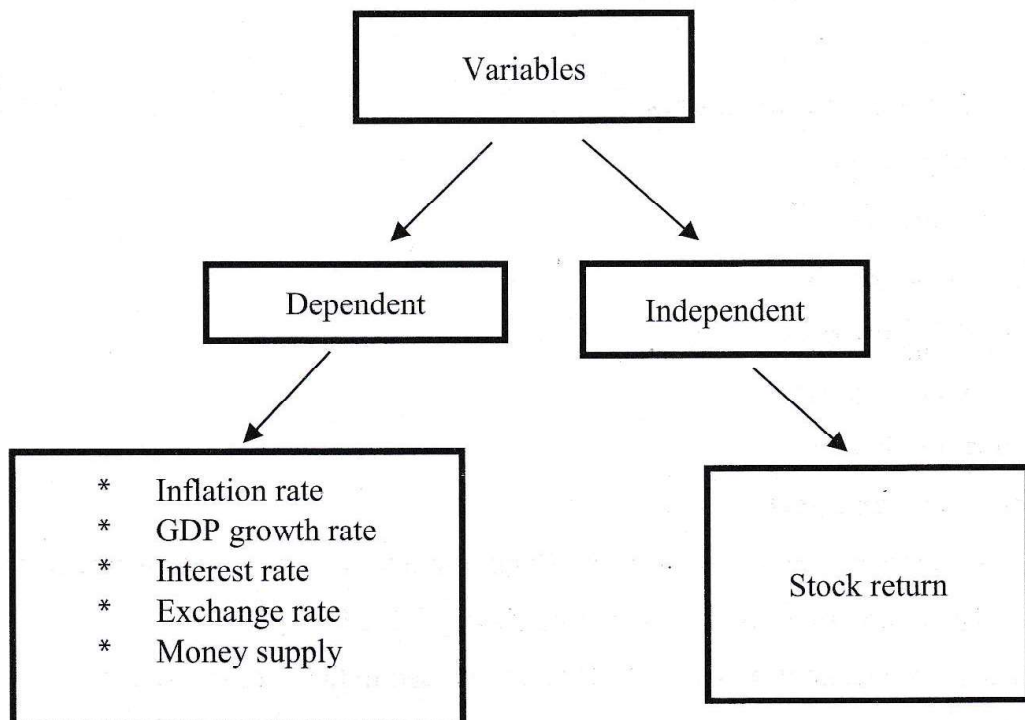
Data is collected from DSE Library, Bangladesh Statistical Bureau, Bangladesh Economic Reviews and published documents of Bangladesh Bank.

#### 4.4 Data analysis:

Data is analyzed by using SPSS 16.0 software.

#### 4.5 Variable identification

Two types of variables have been used namely-Independent variable; and Dependent variable.





## 4.6 Hypotheses development

Hypothesis-1

H<sub>0</sub>: There is no relationship between inflation and returns on share price index.

Hypothesis-2

H<sub>0</sub>: There is no relationship between interest rate and returns on share price index.

Hypothesis-3

H<sub>0</sub>: There is no relationship between exchange rate and returns on share price index.

Hypothesis-4

H<sub>0</sub>: There is no relationship between GDP growth rate and returns on share price index.

Hypothesis-5

H<sub>0</sub>: There is no relationship between money supply and returns on share price index.

Hypothesis-6

H<sub>0</sub>: There are no relationship among inflation rate, interest rate, exchange rate, GDP growth rate, money supply and returns on share price index.

## 5.0 Model used

Stock Market Return = f (Inflation rate, Interest rate, Exchange rate, GDP growth rate and Money supply)

For testing hypotheses

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e_{ij}$$

Where a = Intercept

b<sub>1</sub>..... b<sub>n</sub> = Slope coefficients

X<sub>1</sub> = Inflation rate

X<sub>2</sub> = Interest rate

X<sub>3</sub> = Exchange rate

X<sub>4</sub> = GDP growth rate

X<sub>5</sub> = Money supply

e<sub>ij</sub> = Error terms

## 6.0 Theoretical framework

Interest rate: "The market price at which resources are transferred between at the present and the future. The return of saving and cost of borrowing," Mankiw [42].

Yearly change in interest rate is used. Calculation is used in the following way:

$$IR = (IR_t - IR_{t-1})$$



Where,  $IR_t$  = Yearly interest rate in time t

$$IR_{t-1} = \text{Yearly interest rate in time } t-1$$

Money Supply: It is generally assumed that money supply is determined by the Bangladesh Bank. "By money supply we mean the total stock of monetary media of exchange available to a society for use in connection with the economic activity of the country. According to the standard concept of money supply, it is composed of two elements (a) currency with the public and (b) demand deposit with the public." Changes in money supply are calculated in the following way:

$$MS = (M2_t - M2_{t-1})$$

Where,  $M2_t$  = Yearly money supply in time t

$$M2_{t-1} = \text{Yearly money supply in time } t-1$$

Inflation Rate: "Inflation is an increase in the price level" (Mankiw 2000). Inflation rate is calculated based on Consumer Price Index.

$$IF = \{(CPI_t - CPI_{t-1}) / CPI_{t-1}\} * 100$$

Where,  $CPI_t$  = Yearly inflation rate in time t

$$CPI_{t-1} = \text{Yearly inflation rate in time } t-1$$

Exchange Rate: "The exchange rate is the price of foreign currency" (Gordon 1993). Changes in exchange rate are calculated in the following way:

$$ER = (ER_t - ER_{t-1})$$

Where,  $ER_t$  = Yearly exchange rate in time t

$$ER_{t-1} = \text{Yearly exchange rate in time } t-1$$

GDP Growth Rate: Gross Domestic Product (GDP) is total production of a country. It is calculated in the following way:

$$GR = \{(GR_t - GR_{t-1}) / GR_{t-1}\} * 100$$

Where,  $GR_t$  = Yearly GDP growth rate in time t

$$GR_{t-1} = \text{Yearly GDP growth rate in time } t-1$$

Stock Market Return: All share price index is used to calculate stock market return. Stock market return is change of closing all share price index at year t and closing all share price index at t-1. Change in stock market return is calculated in the following way:

$$SMR = \{(SMR_t - SMR_{t-1}) / SMR_{t-1}\} * 100$$

Where,  $SMR_t$  = Yearly stock market return in time t

$$SMR_{t-1} = \text{Yearly stock market return in time } t-1$$



## 7.0 Findings and analysis

### 7.1 Relationship between inflation and DSE index

Model summary

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	0.157	0.023	-0.097	41.32549

The relationship between inflation and DSE Index is 0.157 that indicates there was a very weak relationship between inflation and DSE Index. Here R<sup>2</sup> is .025 which indicates only 2.5% dependent variable is explained the independent variable.

ANOVA

Model	Sum of square	df	Mean square	F	Sig.
Regression	344.470		344.470	0.202	0.665
Residual	13662.369	1	1707.796		
Total	14006.839	8			

The *F*-test ratio indicates that the null hypothesis is rejected. It means that there was relation between inflation and DSE Index in the study period.

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	$\beta$	Std. Error	$\beta$		
(Constant)	1.696	50.397		0.034	0.974
Inflation	3.861	7.213	0.186	0.535	0.607

### 7.2 Relationship between GDP and DSE index

Model summary

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	0.173	0.030	-0.091	41.21285

The relationship between GDP and DSE Index is 0.173 that indicates there was a very weak relationship between inflation and DSE Index. Here R<sup>2</sup> is .030 which indicates only 3% dependent variable is explained the independent variable.

## ANOVA

Model	Sum of square	df	Mean square	F	Sig.
Regression	418.846	1	418.846	0.24	0.633
Residual	13587.993	8	1698.499		
Total	14006.839				

The  $F$ -test ratio suggests that the null hypothesis is rejected. It means that there was no relationship between GDP and DSE Index.

## Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t- value	Sig.
	$\beta$	Std. Error	$\beta$		
(Constant)	-24.278	105.598		-0.230	0.824
GDP	9.236	18.780	0.173	0.497	0.633

### 7.3 Relationship between Exchange Rate and DSE index

## Model summary

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	0.328	0.108	-0.004	39.52161

The relationship between Exchange Rate and DSE index is 0.328 that indicates there was a low relationship between Exchange Rate and DSE Index. Here R<sup>2</sup> is 0.108 which indicates only 10.8% dependent variable is explained the independent variable.

## ANOVA

Model	Sum of square	df	Mean square	F	Sig.
Regression	418.846	1	418.846	0.24	0.633
Residual	13587.993	8	1698.499		
Total	14006.839	9			

The  $F$ -test ratio suggests that the null hypothesis is rejected. It means that there was no relationship between Exchange Rate and DSE Index.



Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	$\beta$	Std. Error	$\beta$		
(Constant)	-24.278	105.598		-0.230	0.824
GDP	9.236	18.780	0.173	0.497	0.633

**7.4 Relationship between interest rate and DSE index**

Model summary

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	0.17	0.029	-0.092	41.23071

The relationship between interest rate and DSE Index is 0.17 that indicates there was a very weak relationship between interest rate and DSE Index. Here R<sup>2</sup> is .029 which indicates only 2.9% dependent variable is explained the independent variable.

ANOVA

Model	Sum of square	df	Mean square	F	Sig.
Regression	407.067	1	407.067	0.239	0.638
Residual	13599.772	8	1699.972		
Total	14006.839				

The *F*- test ratio suggests that the null hypothesis is rejected. It means that there was no relationship between interest rate and DSE Index.

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t-value	Sig.
	$\beta$	Std. Error	$\beta$		
(Constant)	135.634	220.834		0.614	0.556
Interest rate	-8.978	18.346	-0.17	-0.489	0.638

## 7.5 Relationship between Money Supply and DSE index

### Model summary

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
1	0.16	0.025	-0.096	41.30668

The relationship between Money Supply and DSE Index is 0.16 that indicates there was a very weak relationship between Money Supply and DSE Index. Here R<sup>2</sup> is .025 which indicates only 2.5% dependent variable is explained the independent variable.

### ANOVA

Model	Sum of square	df	Mean square	F	Sig.
Regression	356.905	1	356.905	0.209	0.660
Residual	13649.934	8	1706.242		
Total	14006.839				

The *F*-test ratio suggests that the null hypothesis is rejected. It means that there was no prelateship between Money Supply and DSE Index.

### Coefficients

Model	Unstandardized Coefficient		Standardized Coefficients	t-value	Sig.
	$\beta$	Std. Error	$\beta$		
(Constant)	-24.117	114.176		-0.211	0.838
Money Supply	3.123	6.829	0.160	0.457	0.660

## 8.0 Major Findings

The study discloses the following key points

- The individual effect of macro-economic variables (i.e. interest rate, inflation rate, GDP growth rate, money supply and exchange rate) were not sensitive to stock return during the study period.
- The combined effect also resembles with the individual effect.
- The DSE market was not able to provide the signal of efficient market hypothesis during the study period.



## 9.0 Conclusion

Stock Market is the economic barometer of any country. In an efficient market, the economic push and pull will reflect in the stock market return. In this article, an initiative to justify the truth. In this study, money supply, interest rate, exchange rate, GDP growth rate and inflation as independent macro-economic variables and Stock Market return as dependent variable have been considered. The study reveals that there is no relation between macro-economic variables and Stock Market return in Dhaka Stock Market. It implies that Stock Market return is not sensitive to changes in the macroeconomic variables. It also alerts the present and prospective investors that Dhaka Stock Market is not an efficient market because it ignores major economic variables.

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