IMPACT OF MACROECONOMIC VARIABLES ON STOCK MARKET PERFORMANCE : EVIDENCE FROM DHAKA STOCK EXCHANGE

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Abstract

Understanding the effect of overall macroeconomic variables on stock prices is fundamental to the development of proper financial markets. This study looks into the interrelationship between major macroeconomic variables and stock market performance and attempts to corroborate empirical evidence from developed and developing markets by collecting data on five relevant macroeconomic factors from Bangladesh and performance data from Dhaka Stock Exchange (DSE) – Bangladesh's primary stock market, for the period of July 2010 to December 2021. The overarching hypothesis was that in a reasonably mature stock market operating in a fast-growing economy, inflation rate, foreign exchange rate, broad money supply, foreign currency reserves, and medium-term government bond rates will have a quantifiably significant impact on stock market movements and can be modelled for better understanding and future market predictions. Accounting for normality and stationarity patterns, Autoregressive Distributed Lag Model (ARDL) was found as a reasonably good fit for the data observed. DSE stock returns were found to be negatively significantly affected by inflation rate and broad money supply (M2), while positively significantly impacted by foreign currency reserves. Subsequently, Vector Auto Regression (VAR) showed that these variables have no long-term effect on stock performance, which was confirmed by the Granger Causality Test as well. The findings are consistent with similar studies in developed and developing markets worldwide.

Keywords : *Dhaka Stock Exchange, Macroeconomic Variables, Stock Performance, Autoregressive Distributed Lag Model, Granger Causality Test, Vector Auto Regression*

JEL Classification : *C30, C39, E44, G12*

1. INTRODUCTION

Since capital market is a major channel of financial resource accumulation and distribution, better investment and policy decisions related to capital markets can be expected to result in more efficient sourcing and channelling of a society's limited

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capital resources. The goal is to identify and finance the most deserving candidates. For an emerging economy like Bangladesh, this is crucially important for the proper development of financial markets and broadly speaking, for the sustainable and inclusive development for all. Understanding the effect of overall macroeconomic variables on stock prices is a fundamental starting point to this end.

Although the exact connection amongst various macroeconomic variables and stock prices has not been modelled for any market due to a host of reasons that include the dynamic and multivariate nature of the relationship, constantly evolving market structures, and investor behaviours, the relationship is better documented for developed markets compared to emerging economies like Bangladesh.

Existing studies on the effect of macroeconomic variables on stock market performance from different markets in developed and developing economies point to a multitude of possible relevant factors, with growth, inflation, and exchange rate being the most dominant in almost all types and sizes of economies studied. However, these variables alone cannot properly explain the observed variations in stock performance and it can be argued that there exists a set of macroeconomic variables which are more relevant to one economy compared to others. This can be due to multiple reasons such as market-specific factors, types of financial systems organization, levels of efficiencies of a given capital market, and reliability and timeliness of data used to understand the relationship.

This would suggest that starting with a reasonably broad set of probable explanatory variables and identifying key ones for a given market condition is a good approach in understanding this relationship with regards to a specific economy during a given time period. This paper intends to draw from the literature on this topic and test this relationship for a number of macroeconomic variables for Bangladesh in order to identify a model that reasonably explains the relationship.

2. LITERATURE REVIEW

The correlation of various macroeconomic indicators and stock market performance has been studied in many countries. Variables such as money supply, production index, and government bond rates have been found to be closely correlated with stock market performance in Japan (Mukherjee & Naka, 1995). Evidence gathered from UK, Germany, and a few other European countries over a long study horizon from 1962 to 1995 (Nasseh & Strauss, 2000) suggest that macroeconomic variables of a country can be both positively and negatively co-integrated with stock market performance and they can have impacts on neighbouring countries' stocks as well. A paper on the Kuwait stock market examined how earnings and other macroeconomic factors contribute to share prices within the context of 'prices leading earnings'. Focusing on the Kuwait Stock Exchange (KSE), the study revealed that the relationship between earnings and share prices becomes more pronounced and significant when considering leading periods, suggesting that prices predict future earnings (Al-Qenae et al., 2002). Ibrahim and Aziz (2003) investigated the dynamic connections between

stock prices and four key macroeconomic variables in Malaysia, utilizing established methods of cointegration and vector autoregression. The findings indicated a lasting relationship between these variables and stock prices, alongside significant short-term interactions. Specifically, it identified positive relationships in both short and long terms between stock prices and two macroeconomic factors, while noting a negative association with the exchange rate. Regarding money supply, the study highlighted immediate positive liquidity effects but negative long-term impact on stock prices due to its expansion. The paper also observed the predictive capacity of stock prices for macroeconomic variables, albeit with irregularities during recent crises. Notably, it witnessed the diminishing immediate positive liquidity effects of money supply shocks over time and unstable interactions between stock prices and the exchange rate.

Abugri (2008) conducted a study on the Latin American equity market including the markets of Chile, Mexico, Brazil, and Argentina. He found that the market volatility, measured by the standard deviations of returns, is generally high and empirical findings revealed that shocks from country-specific variables affect markets to different extents. Global variables consistently exhibit significant effects on all four markets, with impulse response functions indicating consistent effects across these variables. The study drew several conclusions: firstly, the response of market returns to shocks in macroeconomic variables varies between countries and cannot be predetermined. Secondly, global variables consistently hold more importance than domestic variables in explaining returns across markets.

A study on how foreign exchange reserves influence stock market growth in Ghana from December 2001 to December 2015 was conducted by Abakah and Abakah (2016). It utilized a multivariate approach, incorporating interest rate variables in the analysis and discovered a noteworthy positive correlation between foreign exchange reserves and stock market capitalization.

Other such studies conducted in developed and developing economies alike found significant positive and negative effects of different macroeconomic variables and respective stock market performance data. These relationships can be incorporated for a deeper understanding of how markets operate and use that for predictive modelling. However, different studies have used different quantitative models to account for such co-relations. Ibrahim and Aziz (2003) used a Vector Auto-Regression model, Gunasekarage et al. (2004) deployed a Vector Error Correction model, Okafor et al. (2011) estimated a multivariate regression model, while an Ordinary Least Square (OLS) Regression approach was followed by Somoye et al. (2009) to model the relationship.

For an emerging economy like Bangladesh with immense growth potential, understanding such relationship is crucial for the development of capital markets that are capable of complementing the overall economic growth. Similar studies had been conducted in Bangladesh in this regard. One such study by Chowdhury and Rahman (2004) used the methodology of Schwert (1990) and Bollerslev (1986)- a

Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model- to account for the volatility clusters of the stock prices. Similar investigation was conducted by Saeed et al. (2006) to look into possible relationship between volatility of macroeconomic variables and that of stock prices. In both of these studies, evidence for significant relationship was found. However, contrary evidences have also surfaced in other studies deploying different methods. For example, after employing Granger Causality test for data from Bangladesh, India, and Pakistan, Rahman and Uddin (2009) found that exchange rates have no causality relationship with stock prices. This can possibly be explained by the fact that all three of these stock markets are predominantly domestic investor-driven and the number of foreign companies enlisted in their exchanges is miniscule compared to the total market depth. Ahmed and Imam (2007) used a co-integration approach to investigate this relationship. Mohiuddin et al. (2008) carried out a similar study and found strong evidence in support of the relationship between various macroeconomic variables.

Money supply and inflation rate, on the other hand, have been found to strongly impact domestic stock market prices, as evidenced by the results of Granger Causality Test and co-integration test by Afzal and Hossain (2011). Studying the Bangladeshi stock market for the period of 2003-2011, they found stock prices to have long-term causality relationship with M1, M2, and inflation rate. Deploying similar methodology, Ali (2011) detected signs of informational efficiency of the market and long-term causality relationship with regards to money supply and inflation in the economy. However, significant relationship was found for M2 in the short run in this study.

However, if we explore the recent literature, we see different findings regarding the macroeconomic factors that influence the stock market returns. A study on macroeconomic variables and stock market indices on the US and Canada used Cointegration and Vector Error correction models to assess the relationship between macro variables and stock return and found that for the US, money supply influences the stock indices positively but the interest rate affects the stock market returns negatively. For Canada, the tests did not find any direct link between these two variables (Bhuiyan & Chowdhury, 2020). A study on China and the US found that volatility persisted in both the stock markets of the US and China. This study identified a very weak and inconsistent unidirectional causality for China running from stock market to macro variables. In contrast, for the US, the contemporaneous relationship between stock market and macroeconomic risk factors is quite strong and bidirectional (Abbas & Wang, 2020).

The studies that have been conducted so far on Bangladesh have provided differing evidence for different macroeconomic variables. At times, contradictory evidence has surfaced for the same macroeconomic variable with regards to the direction of their relationship with stock prices. Also, most previous studies have focused on one or two variables and overlooked others. Hence, there is a need for research incorporating a larger number of relevant macroeconomic variables as well as looking into the

causality relationship and direction among these variables for Bangladesh. This study aims to address this research gap and add to a growing body of literature for this topic specifically for Bangladesh, by looking into five macroeconomic variables and attempts to see the nature, extent, and direction of impact they have on the monthly return data from Dhaka Stock Exchange.

3. DATA AND METHODOLOGY

The current study was based on an extensive review of relevant literature and quantitative modelling of economic and stock market variables under consideration. It is an important empirical enquiry whether stock market performance is related to or affected by broad macroeconomic variables relating to money supply, inflation, trade balance, growth, and interest and exchange rates as well as other relevant factors that are quantifiable. To this end, the present study aimed to look into Dhaka Stock Exchange (DSE), one of Bangladesh's largest stock markets and indeed one of the only two such organized capital markets in the country.

3.1 Data Collection

From the various macroeconomic variables, five were chosen for this research as "possible explanatory factors" for investigation. This selection, although not exhaustive of the set of all possible such factors, incorporates the major indicators most likely to explain movements in stock market performance. It is understood that data availability limitations did have its role to play in the final selection.

Exchange rate, inflation rate, broad money supply (M2), foreign currency reserves, and 5-year treasury bond rates constituted the set of "explanatory variables". Monthly stock return data from Dhaka Stock Exchange (DSE) was the explained variable for this study. Monthly datapoints on each of these variables were collected from official DSE website[a], Bangladesh Bank (the Central Bank of Bangladesh) publication[b], and World Bank databases[c] for the time frame from July 2010 to December 2021.

3.2 Analysis and Modelling of Data

Preliminary analysis constituted a descriptive analysis and visualization of the variables along with a Jarque-Bera test of normality. Data were evaluated for skewness, kurtosis, and normality. Subsequent graphical presentation provided evidence of these and non-stationarity features in some of the variables. In order for determination of the order of integration of the macroeconomic variables, Augmented Dickey-Fuller (ADF) test of stationarity was used. Residual statistics were found which represented variables that are not serially correlated but are normally distributed. The Hannan-Quinn Information Criterion (HQIC) was used for the selection of the best model out of a finite number of fitted models. The model selection criterion is given as:

$$HQC = -2L_{max} + 2k*\ln(\ln(n)) \quad (1)$$

a https://www.dsebd.org/
b https://www.bb.org.bd/en/index.php/publication/index
c https://data.worldbank.org/country/bangladesh?view=chart

Here, L_{max}, k, and n denote the log-likelihood, number of parameters, and the number of observations respectively. Due to variation of integration class of the dependent and independent variables, an Autoregressive Distributed Lag (ARDL) model was utilized. ARDL has been chosen to structure the connexion amongst economic variables in a 'single-equation time-series setup' (Kripfganz & Schneider, 2018). Another reason for selecting ARDL is that nonstationary variables' cointegration is 'equivalent to an error-correction (EC) process and the ARDL model has a reparameterization in EC form' (Engle & Granger, 1987; Hassler & Wolters, 2006). The ARDL (p, q, ..., q) model is as follows:

$$y_t = c_0 + c_1 t + \sum_{i=1}^{p} \emptyset y_{t-1} + \sum_{i=0}^{q} \beta'_i x_{t-1} + u_t \quad (2)$$

Here,

t = max (p, q), ..., T;

with the assumption that all the variables in the vector x_t have the same lag order 'q'. Any variables in $(y_t, x't)'$ are either entirely I(0), entirely I(1), or co-integrated (Pesaran et al., 2001). The optimum lag orders 'p' and 'q' (may vary for different regressors) are found by minimization of model selection criterion.

Next, a series of tests were carried out to check whether the factors considered have any long-term impact on DSE returns. Granger Causality Test had been carried out at first to find if there is any significant long-term impact of any of the macroeconomic variables, used in this research, on stock market performance. Subsequently, Vector Auto Regression (VAR) was estimated along with estimation of impulse response functions.

In determining the causality relationship between variables, this study used the methodology deployed by Granger (1988). A variable X can be defined as 'causal' to variable Y if either X is found to be the cause of Y or Y is found to be the cause of X. The actual cause and effect relationship is not tested through a Granger Causality Test. Instead, it is checked whether a particular variable comes before another in the time series (Granger, 1969). The following equations can be used to find if $\beta_j = 0$ for all lags j:

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + c_1 + v_1(t) \quad (3)$$

$$y(t) = \sum_{i=1}^{\infty} \alpha_i y(t-i) + \sum_{j=1}^{\infty} \beta_j y(t-j) + c_2 + v_2(t) \quad (4)$$

The equations to determine if y(t) Granger-causes x(t) is as follows:

$$x(t) = \sum_{i=1}^{\infty} \alpha_i x(t-i) + c_1 + u_1(t) \quad (5)$$

$$x(t) = \sum_{i=1}^{\infty} \alpha_i x(t-i) + \sum_{j=1}^{\infty} \beta_j y(t-j) + c_2 + u_2(t) \quad (6)$$

Then, F-statistic was calculated. For any value more than the F-value, the null hypothesis was rejected. Apart from the Autoregressive Distributed Lag Model, a Vector Auto Regression (VAR) model was also fitted in to examine the dynamic relationship between the market index return and the macroeconomic variables. A VAR model is employed to quantify relationship among several variables across a period of time.

4. ANALYSIS OF RESULTS

4.1 Descriptive Analysis and Data Visualization

Table 1 summarizes the descriptive analysis of the data. During the observation period, the mean monthly DSE return was 0.8% in a range between -30% and 29%, with a standard deviation of 7%. This shows that the DSE return is highly volatile and the index may rise or fall by a large extent in a very short time. Within the timeframe observed, the exchange rate of USD ranged between BDT 69.0 and BDT 84.95, with the average being BDT 78.2 per USD. Exchange rate volatility during this period may have been due to the fact that the Bangladeshi Taka has depreciated in value over the years.

Table 1 : Descriptive Statistics of the Variables

	DSE Return	Exchange Rate	Inflation Rate	Log of Broad Money	Log of Foreign Reserves	5-Year T-Bond Rate
Mean	0.008134	0.782263	0.068188	5.842906	4.310758	0.080175
Median	0.006476	0.784569	0.061150	5.876960	4.368808	0.080750
Maximum	0.289796	0.849500	0.119700	6.169876	4.633200	0.117800
Minimum	-0.303434	0.690400	0.034600	5.474355	3.888853	0.040000
Std. Dev.	0.071318	0.052492	0.017552	0.207151	0.213723	0.019725
Skewness	0.039163	-0.432657	1.199527	-0.152691	-0.339635	0.110989
Kurtosis	7.041175	1.947914	3.685181	1.624853	1.491862	2.060076
Sum	1.122462	107.9523	9.410000	806.3210	594.8846	11.06420
Sum Sq. Dev.	0.696809	0.377487	0.042204	5.878874	6.257831	0.053302
Observations	138	138	138	138	138	138

Mean inflation is 6.82% while 5-year T-bond rate is 8.02%. Inflation was as high as 11.97% and as low as 3.46% while the 5-year T-bond rate also rose to 11.78% and fell to 4% during the observation period. The mean value of logarithm of broad money is 5.84 while that of foreign reserves is 4.31. DSE Return, Inflation Rate, and 5-Year T-Bond Rate are positively skewed while the other three variables are negatively skewed.

A normally distributed variable should have a kurtosis of 3. In the dataset, only Inflation Rate has a kurtosis around 3, suggesting that it is normally distributed. All other variables either have a larger or smaller kurtosis value. The results of kurtosis were not completely consistent with those of skewness. So, Jarque-Bera test was carried out to determine which variables are actually normally distributed and the result is presented in Table 2.

Table 2 : Summary Results from Jarque-Bera Test of Normality

	DSE Return	Exchange Rate	Inflation Rate	Log of Broad Money	Log of Foreign Reserves	5-Year T-Bond Rate
Jarque-Bera	93.93910	10.67001	35.79334	11.40966	15.73135	5.363211
Probability	0.000000	0.004820	0.000000	0.003330	0.000384	0.068453

At 5% level of significance, the null hypothesis was rejected for all variables except 5-year T-bond rate, so conclusion can be drawn that DSE Return, Exchange Rate, Inflation Rate, Log of Broad Money, and Log of Foreign Reserves all follow a normal distribution. To further look for normality patterns and possible trends, these variables are graphically presented in Figure 1. The 5-year data showed patterns of normality and uptrend. It can be observed that DSE return was more or less stable over the years, while Exchange rate, Log of Broad Money, and Log of Foreign Reserves displayed an upward trend. Inflation Rate and 5-year T-Bond Rate did not have any distinguishable pattern. Since non-stationarity is present in data (there is an upward trend over time), unit root tests were needed to find out the level of stationarity and confirm the results.

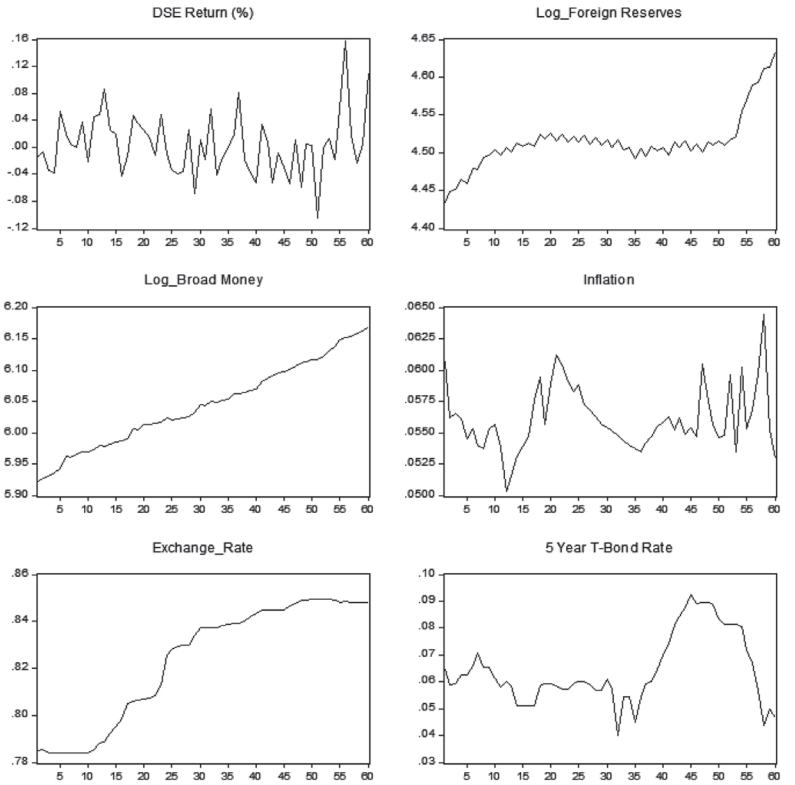

Figure 1 : Time Series Graph of the Selected Variables

4.2 Augmented Dickey-Fuller (ADF) Test (Level)

Table 3 shows the results from Augmented Dickey-Fuller (ADF) tests. At 1% level of significance, the null hypothesis was rejected for DSE Return. For the rest of the variables, the null hypothesis could not be rejected indicating the presence of unit roots for Exchange Rate, Inflation Rate, Log of Broad Money, Log of Foreign Reserves, and 5-Year T-Bond Rate. A 1st difference unit root test had to be performed for these five variables.

Table 3 : Summary Results from ADF Test

	DSE Return	Exchange Rate	Inflation Rate	Log of Broad Money	Log of Foreign Reserves	5-Year T-Bond Rate
ADF Test Statistic	-8.9317	-2.3151	-1.3101	-0.2483	1.3019	-0.6421
Probability	0.0000	0.1698	0.6214	0.9268	0.9985	0.8542

4.3 Unit Root Test (1st Difference)

Table 4 represents the unit root test (1st difference) results. Of the 5 variables, at I(1), none has a unit root and the null hypotheses for all were rejected at 1% level of significance.

Table 4 : Unit Root Test (1st Differentiation) Result Summary

	Exchange Rate	Inflation Rate	Log of Broad Money	Log of Foreign Reserves	5-Year T-Bond Rate
ADF Test Statistic I(1)	-7.9379	-1.3101	-9.7750	-6.0943	-7.6448
Probability	0.0000	0.000	0.0000	0.0000	0.0000

4.4 Model Selection Criteria

Information Criterion was utilized to determine the goodness-of-fit of models of the data used. Specifically, Hannan-Quinn Information Criteria (HQIC) was selected as it has a greater penalty term attached to the number of model parameters being used compared to Akaike Information Criterion (AIC) and Schwarz Bayesian Information Criterion (SBIC) (Akaike, 1974; Hannan & Quinn, 1979; Schwarz, 1978). The next figure shows the HQICs of the fitted models.

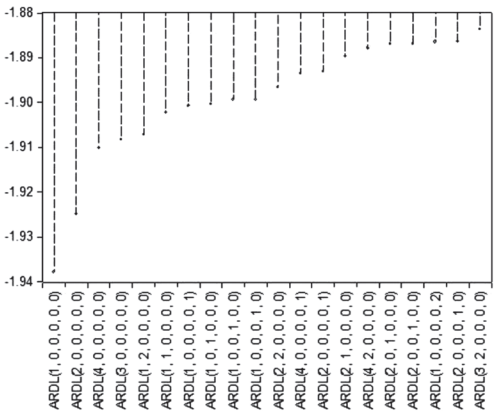

Figure 2 : HQIC values for Fitted Models

4.5 Autoregressive Distributed Lag (ARDL) Model

An ARDL model (1) was used as the explanatory variables had a '0' lag while the explained variable (DSE Return) had a lag of '1'. Ordinary Least Square (OLS) regression would have been appropriate if both categories of variables had a '0' lag. In case of a common lag of '1', the Vector Error Correction (VEC) could be used. In this case, ARDL model was appropriate for finding the correlation. Table 5 shows the coefficient and p-values from the ARDL model.

Table 5 : ARDL Model's Coefficient and p-values

Variables	Coefficient	p-values
DSE Return (-1)	-0.121322	0.3017
Inflation Rate	-1.118221	0.0797
Exchange Rate	-0.062895	0.8405
Log of Broad Money	-0.789675	0.0243
Log of Foreign Reserves	0.523703	0.0665
5-Year-T-Bond Rate	0.002721	0.9463

The null hypotheses for Inflation Rate, Log of Broad Money, and Log of Foreign Reserves were rejected at a 10% level of significance, while those for Exchange Rate and 5-Year T-Bond Rate could not be rejected. This indicated that inflation rate, broad money (M2), and foreign currency reserves significantly affect DSE return while exchange rate and 5-year T-bond rate did not. Inflation and broad money have a negative impact on stock market performance as observed from the coefficients of –1.12 and -0.79 respectively. On the other hand, DSE return directly depends on foreign reserves as observed from the coefficient of 0.52. These findings are consistent with similar studies performed in both developed and developing markets across the globe. Feldstein (1978) and Nissim and Penman (2003) mentioned the effect of inflation on corporate earnings of enlisted companies in the stock exchange. They proposed that inflation raised corporate tax rates since cost of sales do not spontaneously change with inflation. Fama (1981) studied the effect of higher expected inflation on real income and suggested that as expectations of inflation went up, real income went down which ultimately affected all companies in the market.

In relation to the association between money supply and stock market earnings, different propositions exist with Keynesian economists arguing for a negative relationship between the two variables while real activity economics consider a positive relation between them. In this study, evidence supports the former of the two. The Keynesian theoretical link between the two, as observed in the study, is that a positive supply shock raises expectation for contractionary monetary policy, in turn prompting investors to seek more funds, driving interest and subsequently discount rates higher. As a result, current valuation of future earnings drops. This prompts a downturn in earnings from stock market.

The positive relationship between foreign currency reserves and stock market earnings, as found in this study, is consistent with findings from previous studies. Kurihara (2016) and Ray (2012) discovered the positive effect of foreign currency reserves on stock market performance in their respective studies. Estimation equation for the model, substituted with coefficients, is as follows:

$$DseReturn = -0.121322017042*DseReturn+0.0027205651194*5YearTBondRate + 0.0628945484007*ExchangeRate-1.11822117507 *Inflation-0.78967547878*LogBroadMoney+0.52370331443 *LogForeignReserves+2.3694520904 \quad (7)$$

The cointegration equation is as follows:

$$D(DseReturn) = 0.002720565119*D(5YearTBondRate)+0.0628945484007 *D(ExchangeRate)-1.118221175070 *D(Inflation-0.78967547878*D(LogBroadMoney) +0.523703314431*D(LogForeignReserves) -0.121322017042*DseReturn-0.00242621*5YearBondRate (-1)+0.05608965*ExchangeRate(-1)-0.46704096 *LogForeignReserves(-1)+2.11308828 \quad (7)$$

4.6 Granger Causality Test

A Granger Causality Test was performed to check if there was any long-term impact of the macroeconomic variables on DSE performance. Table 6 sums up the outcome of the test and the null hypotheses. At a 5% level of significance, it can be observed that none of the null hypotheses were rejected, indicating that none of the macroeconomic variables exhibited any long-run impact on DSE return.

Table 6 : Output from Granger Causality Test

Null Hypothesis	Obs	F-Statistic	Prob.
EXCHANGE_RATE does not Granger Cause DSE_RETURN	136	0.43738	0.6467
DSE_RETURN does not Granger Cause EXCHANGE_RATE		0.41124	0.6637
INFLATION does not Granger Cause DSE_RETURN	136	1.10845	0.3331
DSE_RETURN does not Granger Cause INFLATION		2.58369	0.0793
LOG_BROAD_MONEY does not Granger Cause DSE_RETURN	136	0.63610	0.5310
DSE_RETURN does not Granger Cause LOG_BROAD_MONEY		0.53973	0.5842
LOG_FOREIGN_RESERVES does not Granger Cause DSE_RETURN	136	0.77853	0.4612
DSE_RETURN does not Granger Cause LOG_FOREIGN_RESERVES		0.35765	0.7000
_5_YEAR_T_BOND_RATE does not Granger Cause DSE_RETURN	136	2.58193	0.0795
DSE_RETURN does not Granger Cause _5_YEAR_T_BOND_RATE		0.09703	0.9076

4.7 Vector Autoregression (VAR) Estimates and Impulse Response Function

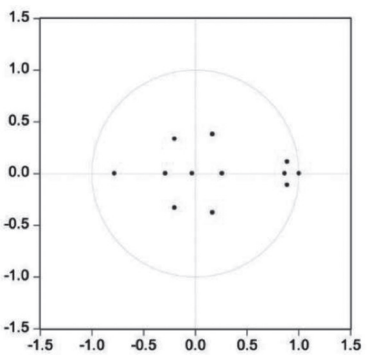

Figure 3 : Inverse Roots of AR Polynomials

A VAR was carried out next to further check the accuracy of the results of the Granger Causality Test. The results showed that all the t-values are less than 1.96, meaning that the macroeconomic variables did influence DSE return in the long-term. The signs show the kind of relationship these variables had with DSE return. Findings from VAR was thus consistent with the results from the ARDL model. Before performing an impulse response, VAR stability conditions need to be satisfied (Glaister, 1991). Figure 3 shows the inverse roots of the characteristic autoregressive (AR) polynomials. Here, the VAR estimation is steady since most of the roots are of near zero modulus and fall inside the unit circle. Hence, impulse responses can now be utilised. These are derived from the VAR and are used to see how the model is affected by the system. Figure 4 shows the corresponding charts for the five macroeconomic variables. In each of the charts, the blue line becomes flat within a few years, further emphasizing that none of the macroeconomic factors has any long-term influence on stock market performance. For first three years, there were fluctuations in every graph. For inflation rate and foreign exchange reserves, the DSE returns have fluctuations for a longer period because stock market performance depends on these factors. The position of the blue line with respect to the x-axis shows the direction of the relationship with DSE return: negative if its below x-axis (inflation rate and broad money) and positive if above x-axis.

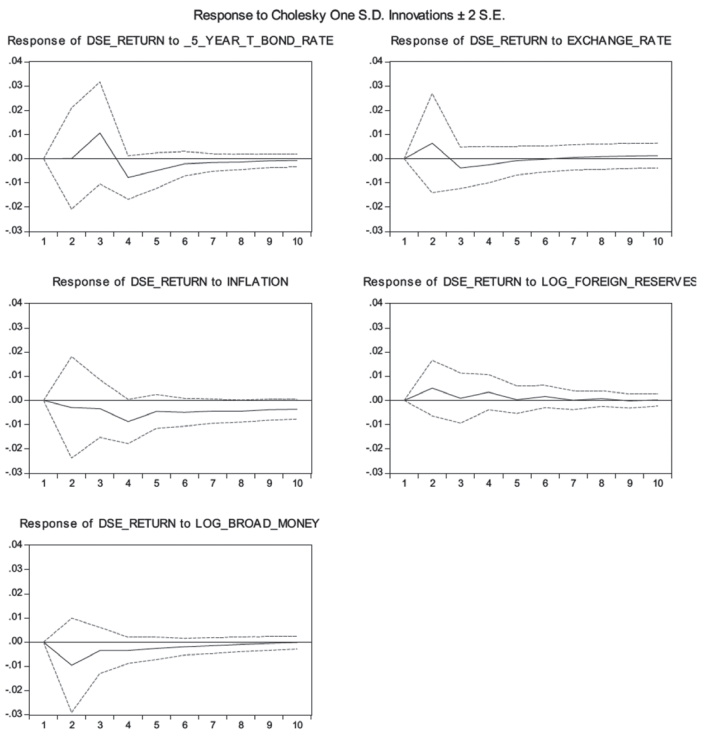

Figure 4 : Impulse Responses

5. FINDINGS AND CONCLUSION

This study was based on an econometric analysis to find out the relationships of the macroeconomic variables with stock market return. Jarque-Bera test and descriptive statistics were used to check the normality of the data set. Exchange rate, M2, and T-bond rate have been found to have a normal distribution pattern. However, time-series graphs showed that inflation rate has some normality while exchange rate, M2, and foreign exchange reserves are seen to have uptrend over the years. The presence of uptrend led to an Augmented Dickey-Fuller test (or unit root test) to check the order of integration in the data. It has been found that the dependent variable, DSE Return, lies in I(0) and the five macroeconomic variables lie in I(1). Due to the presence of two orders of integrations, Auto Regressive Distributive Lag Model was used to find out the relationship between these factors and DSE Return. Results from ARDL model showed that inflation rate and M2 had a negative impact on DSE return while foreign exchange reserve had a positive impact. The other two variables- exchange rate and T-bond rate- did not have any impact on stock market performance. Next, Granger Causality Test was carried out and it had been discovered that there was no long-term impact of any of the macroeconomic variables used in this research on stock market performance. This was confirmed by Vector Auto Regression as well as impulse response functions.

The capital markets of Bangladesh are still in the process of gaining maturity, market depth, investor financial literacy, regulatory oversight, and efficient functioning. Understanding how fundamental macroeconomic variables affect market movement can aid this development process and facilitate better decision making, resulting in more efficient and effective channelling of resources. While confirming that inflation rate does have an effect on stock price, this study found that instead of foreign exchange rate, foreign currency reserve plays a role in the stock market performance of Bangladesh. The authors believe that the results of this study can be used by the practitioners as a basis for better decision making. Future researchers can conduct further studies by incorporating other variables to identify the most important macro factors that influence the stock market return for a developing country like Bangladesh.

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