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Impact of Macroeconomic Variables on Stock Prices of Bangladesh: Evidence from DSEX

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ABSTRACT: ***The main objectives of this study are to find the significance of relationships between the Bangladesh capital market and selected macroeconomic variables. The final output of this research has expressed a similar condition of capital market with the findings of different researchers from different geographies. The study doesn't find straight results rather mixed results. The bidirectional causality of interest rate to money supply has similarities to money market relationships determination literature. This study has included data from the introduction of DSEX meaning January 2013 to December 2017 which includes the data related to the survival and emergence of the Bangladesh stock market. There are very few studies covering this range of the dataset. The money supply is the most influential macroeconomic variable that doesn't influence the stock price changes meaning that there is an informational inefficiency in the capital market of Bangladesh which is an exception for an efficient market. This informational inefficiency of the stock market is the first and most significant barrier to the development and implementation of trading rules.***

Keywords: Macroeconomic variables, stock prices, money supply, DSEX.

1. INTRODUCTION

The stock exchange is considered as the center of a transaction network where both securities buyers and sellers agreed at a specified price. One of the key roles in the mobilization of capital in an emerging economy like Bangladesh is played by the stock market like DSE and led the commerce and industries growth in the country which is also considered as the consequences of the adoption of globalized and liberalized policies by emerging economies and developing government like us. The expectation of capital market participants is influenced by many factors where macroeconomic variables may have a considerable impact on their

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expectations. Based onthe preliminary assumption is can be said that changes in the macroeconomic variables may have a significant impact on the stock price changes. The purpose of this empirical research is to help in understanding the impact of macroeconomic and variables on the movement of stock prices of the Dhaka Stock Exchange Broad Index (DSEX). For the identification of basic macroeconomic variables during their entry and operation in the stock market, this research paper will help them to make their own investment decision. Four macro-economic variables; Money Supply (MS), Consumer Price Index (CPI) as a proxy of inflation rate, Interest Rate (IR), Exchange Rate (ER), and on the other hand Dhaka Stock Exchange Broad Index in the form of DSEX will be considered in this empirical research.

For the testing and measurement of macro-economic variables impact on Dhaka Stock Exchange Broad Index indices, Unit root tests using Augmented Dickey-Fuller Model, Multivariate regression through Ordinary Least Squared (OLS) method, Johansen cointegration model, Vector Error Correction Model (VECM), and Granger causality test will be used based on monthly data from January 2013 to December 2017. The overall objectives of this research paper are the investigation of macroeconomic variables' impact on the market price of companies categorized under the Dhaka Stock Exchange Broad Index from the introduction of DSEX; January 2013 to December 2017. This paper will achieve the complementarity of the existing research paper. Based onexisting knowledge, there is very little or no research on macroeconomic variables' impact on DSEX categorized companies' stock prices.

2. THEORETICAL FRAMEWORK

2.1 The Efficient Market Hypothesis

The efficient market hypothesis is popularly considered as a random walk theory under which stock markets' immediate incorporation of all available information is assumed irrespective of the point of time. The first user (Eugene Fama) of this theory stated that competition fully affects the new information's instantaneous reflection on the intrinsic value which will affect actual prices in the efficient market. The stock price can be affected by different types of information while strong form hypothesis, semi-strong form hypothesis, and weak form hypothesis are the three variations that show relations depending on the available information types. Having postulation regarding economic factors' full reflection in stock prices, the semi-stock hypothesis is used for the

investigations relationship (positive or negative) between macroeconomic variables and stock prices. As every piece of information is public even financial statements, there is no room for realizing a profit. This situation demands market analysts for getting the implication of this huge amount of publicly available information and its comprehension in the market.

2.2 The Arbitrage Pricing Theory (APT)

Considered as another way of linking macroeconomic variables with stock price and extension of the Capital Asset Pricing Model (CAPM), the Arbitrage Pricing Theory (APT) will be used based on the mean-variance framework considering process generating securities assumption. A multifactor approach to explaining asset pricing through APT is proposed by Ross (1976). According to ross, the money supply variance, changes in expected exchange rates, unanticipated inflation proxied by a consumer price index, and unanticipated movements interest rates term structure shapes are the macroeconomic variables that have the primary influence on stock prices. For the measurement of the specific factors' asset sensitivity, specific coefficients are denoted by these factors. These factors asset prices are determined by approaching APT, and one price law are derived through it. If a market facilitates different prices for stocks with the same value and potentials then an arbitrary opportunity arises and that market can't be recognized as an efficient market. A linear relation is required at the stock prices to some indexes set by APT which are shown in the following equations:

$$Yt = \alpha + \beta 1\ MSPLYt + \beta 2\ CPI\_INt + \beta 3\ SBWADR\_IRt + \beta 4\ ER\_USDt + \varepsilon t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Y	= The index value of the Dhaka Stock Exchange Broad Index.
α	= Stocks (t) expected level of price when all indices value is zero
β	= The sensitivity of selected macroeconomic variables to the stock index
MSPLY t	= The value of money supply (M2) impacting the stocks index
CPI_INt	= The value of inflation impacting the stock price proxied by CPI
SBWADR_IRt	= The value of interest rate impacting the stock price proxied by Scheduled Banks Weighted Average Deposit Rate
ER (USD)t	= The value of BDT and USD exchange rates impacting t stocks price
εt	= A random error term having to mean equal to zero

Chen and Ross (1986) stated the dependency of stocks on both anticipated and unanticipated factors who believed that the unanticipated events are the reason for most of the investor's return realizations which are related to the overall economy. Although investors often realize a return for unsystematic risk, systematic risks mainly influence large portfolios because of the cancellation of individual assets' idiosyncratic returns through the diversification process.

3. LITERATURE REVIEW

Founded in 1954, Dhaka Stock Exchange (DSE) is one of the two stock exchanges in Bangladesh. Total listing is nearly 750 which combined market Capital is nearly 320.5 billion USD. Researchers, investors, and government agencies always consider the measure of predictability and efficiency of stock returns as an interesting topic. Many researchers have centered their empirical studies to draw the relationship between stock price movement with macroeconomic variables changes in the second half of the twentieth century which is prepared based on both emerging and developed capital market index. This relationship between stock prices and macroeconomic variables has been intensively examined in both emerging and developed capital markets. Nelson (1976) examined the stock market return and inflation based on the evidence US market from the post-war period (1953) to 1974. Based on the output of his analysis, he concluded that negative relationships existence on both forecasted and unexpected levels.

Many empirical studies have been done from then on, the basis of developed countries evidence Chen, Roll, and Ross (1986) researched seven macroeconomic variables impact on stock prices in the USA using the multifactor model. Among the seven variables, he found a significant relationship of stock returns with a change in the risk premium, yield curves twist, and industrial productions. No relationships had been found between stock returns and market index, oil price, and consumption. Chen (1991) investigated macroeconomic variables' impact on the US market and discovered selected macroeconomic variables like default spread, term spread, dividend price ratio, the growth rate of industrial production and one-month T-bills incorporation can facilitate the forecasting of stock returns in the future market. Bahmani-Oskooee and Sohrabian (1992) scrutinized relationships between macroeconomic variables with a stock market return based on S & P's monthly values by using the cointegration and Granger causality test. A bidirectional short-term causal relationship has been drawn through this study but no short-term relationship has been found but there were no available long-term relationships. For modeling

macroeconomic variables relationships with Japanese stock prices, the vector error correction approach is used by Mukherjee and Naka (1995) where cointegration relationships have been detected among stock prices and macroeconomic variables including real economic activity, money supply, inflation rate, exchange rate, call money rate and government bond rate. Applied residual-based cointegration test has been run by Habibullah and Baharumshah (1996A) in the evidence of the Malaysian market where no integration had been found between stock indexes with outputs and money supply using monthly data from 1978 to 1992. The informational efficiency of Malaysian was found concerning output and money supply when informational efficiency was found concerningthe money supply using the restricted error correction model.

Gjerde and Saettem (1999), analyzed and scrutinized the Norwegian economy for the determination of relationships among stock prices with macroeconomic variables. Positive linkage has shown between oil prices and real economic activity. However, no significant relationships have been determined between inflation and stock return. Doong et al (2005) examined the relationship between stocks and exchange rates using the Granger causality test based on the evidence from six Asian countries. He found a significant negative relationship between the stock prices and exchange rate changes for almost all the selected countries. Neighboring countries like India, Pakistan have similarities in terms of macroeconomic variables changes where empirical research has been conducted to measure this underlying relationship.

Rahman and Uddin (2009) conducted an empirical analysis to determine the exchange rates of US dollar in terms of Bangladeshi Taka, Indian Rupee, and Pakistani Rupees impact on stock prices based on monthly (from January 2003 to June 2008) evidence from Dhaka Stock Exchange General Index, Bombay Stock Exchange Index and Karachi Stock Exchange. The research suggested that there is no co-integrating relationship between exchange rates and stock prices while the Granger Causality test suggested that there is no causal relationship between exchange rates and stock prices in these countries. Nasrin Afzal and Hossain (2011), researched casual relationships between macroeconomic variables and stock prices based on DSE indexes using cointegration and Granger Causality test. There is the existence of cointegration and long-run relationships between stock prices and selected variables like inflation rate, M1, and M2. In the short run, evidence of unidirectional causalities existence is found from the stock market to M1 and the exchange rate. The existence of long-run causality from M1, M2 to the stock market, and

the stock market to inflation rate was found by them running bivariate Error-Correction Models. And the Granger Causality of M2 to stock piece and other selected variables exists which is also evidenced in this research. All outcomes of their research strongly suggested the DSE market's informational inefficiency.

4. DATA AND METHODOLOGY

4.1 Variable description and Expectation

The DSEX is a broad market index for the Dhaka Stock Exchange. It is the weighted market value of 283 stocks having the largest trading volume on the Dhaka Stock Exchange.

4.2 Money Supply (MS)

M2 is one of the form of the money supply which defines money supply as the holding of all elements of M1 and as well as near money where cash and checking deposits are included in M1 and mutual funds, money market securities, savings deposit, and other time deposits are referred as near money. The existence of a positive effect in stock price with the increase of money supply can be frequently assumed. The economy is stimulated with the growth of the money supply which leads to the availability of huge credit that may be used for the expansion of the firm and increasing the firm's earnings through the increase of the firm's sales.

Better earnings lead to the payment of a better dividend that leads to an increasing in the stock price. But Fama (1981) proved that there can be a negative effect of an increase in money supply because positive growth in money supply leads to the increase of the inflation rate which leads to the increasing of nominal risk-free rate which leads to the rise of discount rate that leads the fall in return. But in this study, apositive relationship between stock price and money supply is expected.

4.3 Consumer Price Index (CPI)

The consumer price index which is widely used as a proxy of inflation is used for determining the underlying negative or positive relationship between stock prices and inflation depending on inflation expectations condition. The exceeding of demand than supply brings inflation to the expected level which increases stock prices as a result of stimulations. For matching with the firm's expectations, this inflation leads to an increase in the firm's earnings through increasing prices. Firms' earnings increase leads to an increase in dividends that increase the stock price. On the contrary, unexpected increases in inflation increase the price of consumer

products that leads the cost of leaving increases which leads investors to withdraw investment and spend that on consumable products. Indeed, nominal interest rates increase with the increase of inflation which will lead to an increase in the discount rate used for intrinsic value calculations. This increase in the discount rate will reduce the present value of net income that will lower the stock price. In terms of the firm's products' high elasticity, the inflation increase will decline the firm's sales, net income, and at the ending of its stock price. Fama (1981) has hypothesized the negativity of the relationship of stock price and unexpected inflation as the relationship function between real economic activity and unexpected inflation. Building this research for finding relationships between stock price and unexpected economic changes based on APT theory, expected negative relationships association between stock price and inflation.

4.4 Interest Rate

Scheduled Bank's weighted average deposit rate (SBWADR) will be considered as the proxy of the interest rate. If investors are offered a return by banks which is near to the estimated stock return, most of the investors will go for the bank's offer by liquidating their share. Because most of the investors are risk-averse and banks offer a deposit rate that is nearly free of risks. For this reason, the variance of scheduled bank deposit rates may have significant term relationships. This scenario has led me to go for using scheduled banks' weighted average deposit rate as a proxy of the interest rate.

When the interest rate increases investors liquidate their money from shareholding and deposited that money to the bank. On the contrary, the decreases in interest rates lead investors to withdraw money and invest in those in the stock market. That's why it is nearly visible that the interest rate has negative relationships with the stock market.

4.5 Exchange Rate

Last but not least macroeconomic variable used in this research is the exchange rate focusing on the bilateral nominal rate of the exchange of Bangladeshi Taka (BDT) against the tone unit of foreign currency, the US Dollar ($). The reason for selecting USD is that we count all export income and remittance by using USD and also maintain reserves in USD. Exchange rate increases decline the price of the stock about the inflation expectations. Besides costs will go high for heavy importer companies for the weakening of the domestic currency and the situation will lower these

company's earnings and stock prices. This reason leads toa negative reaction of the stock market to currency depreciation because the stock market contains a variety of companies. On the contrary, currency depreciation brings winter days for the domestic exporter because foreign clients find domestic goods cheaper. So, at the macroeconomic level import industry got depression but the export industry got a boost from currency depreciation. So, the effects of the exchange rate can have positive or negative relationships with stock prices which depend on the situation. But primarily predominance of negative relationships is assumed based on the work of Doong et al (2005).

Table 01: Regression Variables.

Variables	Explanations	Data source and Period
DSEX	DSEX is the broad stock market index for Dhaka Stock Exchange, in Bangladeshi Taka	Monthly Publication of Bangladesh Bank, January 2013 to December 2017, monthly.
MS	Money supply (M2), Millions Bangladeshi Taka.	Monthly Publication of Bangladesh Bank, January 2013 to December 2017, monthly.
CPI	The Consumer Price Index (CPI) is considered the most common measure of inflation. Here CPI ranges from 0 to 100 with high ratings mean high inflations.	Monthly Publication of Bangladesh Bank, January 2013 to December 2017, monthly.
IR	Scheduled Banks weighted average deposit rates are considered as a proxy to the interest rate.	Monthly Publication of Bangladesh Bank, January 2013 to December 2017, monthly.
ER	Exchange rate, Bangladeshi Taka (BDT) against US Dollars ($).	Monthly Publication of Bangladesh Bank, January 2013 to December 2017, monthly.

4.6 Data

The examination of selected macroeconomic factors' impacts on stock market prices of the Dhaka Stock Exchange Broad Index (DSEX) empirically is the objective of this research paper where DSEX is

considered as the dependent variable. On the other hand, selected based on previous literature, Money Supply (MS), Consumer Price Index (CPI), Scheduled banks weighted average deposit rate (IR) and Exchange Rate (ER) are four macroeconomic variables which going to be used as predictor variables. Monthly data is examined in this study for all variables covering the period from January 2013 to December 2017 (60 monthly observations).

4.7Methodology

The main macroeconomic models run in this study are the Ordinary Least Squared (OLS) for testing underlying relationships between stock price index (DSEX) and macroeconomic variables (money supply, Consumer Price Index, Interest Rates & Exchange Rates), and the Granger Causality test for the examination of interrelationships of explanatory variables and DSEX (either bidirectional, unidirectional or insignificant, no relation). Non-stationary data can arise spurious regression when time-series data are using, which is important to keep in mind because this makes the constructed models' results unreliable.

For avoiding spurious regression, the Augmented Dickey-Fuller test (unit root test) will be conducted firstly for checking the stationarity of time series data. If the output of the test shows non-stationarity of the variables data, before conducting the OLS method and Granger Causality test variables first difference will be employed. The presence of cointegrating vectors in the time series considered as non-stationary time series is determined by Johansen methods applying the procedures of maximum likelihood. Based on relevant literature for econometric model building, we are going to use the following multivariate model:

$$Yt = \alpha + \beta 1\ MSPLYt + \beta 2\ CPI\_INt + \beta 3\ SBWADR\_IRt + \beta 4\ ER\_USDt + \varepsilon t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

5. RESULT AND DISCUSSION

5.1. Unit Root Test

Hypothesis

Null H_0: variable is not stationary or got unit root

ALT H_1: variable is stationary

In the first phase unit tests have been run using the variables before the first difference data which summarised output is given below:

Table 02: Unit root tests output before the first difference.

Unit Root Test before the first difference											
Unit Root Test (DSEX)						**Unit Root Test (CPI)**					
Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value	Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value
	Equation 01	-0.43	-3.57	-2.92	-2.60		Equation 01	0.0	-3.6	-2.9	-2.6
	Equation 02	-1.95	-4.13	-3.49	-3.17		Equation 02	-3.0	-4.1	-3.5	-3.2
Z (t)	Equation 03	1.22	-2.62	-1.95	-1.61	Z (t)	Equation 03	-0.8	-2.6	-2.0	-1.6
Only Equation 03's L1's Coeffient value is Positive						Only Equation 01's L1's Coeffient value is Positive					
Unit Root Test (MS)						**Unit Root Test (IR)**					
Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value	Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value
	Equation 01	0.57	-3.57	-2.92	-2.60		Equation 01	0.29	-3.57	-2.92	-2.60
	Equation 02	-3.44	-4.13	-3.49	-3.17		Equation 02	-2.36	-4.13	-3.49	-3.17
Z (t)	Equation 03	7.27	-2.62	-1.95	-1.61	Z (t)	Equation 03	-6.75	-2.62	-1.95	-1.61
Only Equation 02's L1's Coeffient value is Negative						Only Equation 01's L1's Coeffient value is Positive					
Unit Root Test (ER)											
Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value						
	Equation 01	1.50	-3.57	-2.92	-2.60						
	Equation 02	-1.93	-4.13	-3.49	-3.17						
Z (t)	Equation 03	0.90	-2.62	-1.95	-1.61						
Only Equation 02's L1's Coeffient value is Negative											

In the second phase, unit tests have been run using the variables after calculation of first difference data which summarised output is given below:

Table 03: Unit root tests output after first difference.

Unit Root Test after the first difference											
Unit Root Test (DSEX)						**Unit Root Test (CPI)**					
Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value	Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value
	Equation 01	-7.70	-3.57	-2.92	-2.60		Equation 01	-2.49	-3.57	-2.92	-2.60
	Equation 02	-7.69	-4.13	-3.49	-3.18		Equation 02	-2.79	-4.13	-3.49	-3.18
Z (t)	Equation 03	-7.56	-2.62	-1.95	-1.61	Z (t)	Equation 03	-2.57	-2.62	-1.95	-1.61
Every Equations L1's Coeffient value is negative						Every Equations L1's Coeffient value is negative					
Unit Root Test (MS)						**Unit Root Test (IR)**					
Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value	Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value
	Equation 01	-10.11	-3.57	-2.92	-2.60		Equation 01	-4.99	-3.57	-2.92	-2.60
	Equation 02	-10.21	-4.13	-3.49	-3.18		Equation 02	-4.84	-4.13	-3.49	-3.18
Z (t)	Equation 03	-4.94	-2.62	-1.95	-1.61	Z (t)	Equation 03	-3.08	-2.62	-1.95	-1.61
Every Equations L1's Coeffient value is negative						Every Equations L1's Coeffient value is negative					
Unit Root Test (ER)											
Particulars	Tests	Test Stattistics	1% Critical Value	5% Critical Value	10% Critical Value						
	Equation 01	-2.90	-3.57	-2.92	-2.60						
	Equation 02	-3.94	-4.13	-3.49	-3.18						
Z (t)	Equation 03	-2.79	-2.62	-1.95	-1.61						
Every Equations L1's Coeffient value is negative											

5.2. Heteroscedasticity test

Guidelines: The higher corresponding probability than 5% denotes that the null hypothesis can't be rejected.

Null H_0: residuals are homoscedastic (constant variance)

Alt H_1: Residuals are heteroscedastic

Table 04: Output of Heteroscedasticity test.

Ho: Constant Variance
Variables: fitted values of dsex
Chi2(1) = 0.03
Prob> chi = 0.8612

As the probability value is more than 5% we can't reject the null hypothesis which means residuals are homoscedastic and constant variance exists there.

5.3. Durbin-alternative tests

Guidelines: If the corresponding probability is lower than 5% null hypothesis can't be rejected.

Hypothesis:

Null H_0: Residuals are not serially correlated (autocorrelated)

Alt H_1: Residuals are serially correlated or autocorrelated

Table 05: Output of Durbin's alternative test for correlation.

estatdurbinalt			
Durbin's alternative test for correlation			
lags(p)	chi2	df	prob> chi2
1	45.75	1	0

Corresponding probability is lower than 5% meaning that the null hypothesis can be rejected. So, there is a serial correlation in the residuals.

5.4. Brueschgodfrey LM tests

Guidelines: If the corresponding probability is higher than 5%, the null hypothesis can't be rejected.

Hypothesis:

Null H_0: Residuals are not serially correlated (autocorrelated)

Alt H_1: Residuals are serially correlated or autocorrelated

Table 06: Output of Breusch-Godfrey test for autocorrelation.

estatdurbinalt			
Breusch-Godfrey LM test for autocorrelation			
lags(p)	chi2	df	prob> chi2
1	27.70	1	0

Corresponding probability is lower than 5% meaning that the null hypothesis can be rejected. So, there is a serial correlation in the residuals. Focusing on the output of regression analysis, it can be concluded that this model is very good except for only one thing that both Durbin's alternative tests for autocorrelation and Breusch-Godfrey's LM tests for autocorrelation. Here, R-square is very high, F-statistics is very significant, out of four variables except for interest rates (IR) all are significant. Besides the normal distribution of residuals and existence of constant variance (which denotes the homoscedasticity of variables) has found. It is difficult to say whether the existence of autocorrelation can be ignored or not.

5.5. Regression Model

Hypothesis

Null H_0: Independent variables do not jointly influence DSEX (Dependent Variable)

ALT H_1: Independent variables jointly influence DSEX (Dependent Variable)

Table 07: Output of linear regression.

regress dsexmscpiirerusd						
Source	**SS**	**df**	**MS**		Number of obs	61
					F (4, 56)	63
Model	21027141.10	4	5256785.28		Prob> F	0.00
Residual	4672443.81	56	83436.50		R-squared	0.82
					Adj R-squared	0.81
Total	25699584.90	60	428326.42		Root MSE	288.85
dsex	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf. Interval]**	
ms	7.33	2.38	3.08	0.00	2.56	12.09
cpi	36384.63	14782.82	2.46	0.02	6771.08	65998.19

ir	37373.43	28143.70	1.33	0.19	-19005.18	93752.03
erusd	230.22	58.78	3.92	0.00	112.47	347.97
_cons	-24048.94	3987.23	-6.03	0.00	-32036.30	-16061.57

As for excluding IR, all other variables' corresponding probability is higher than 5%, the null hypothesis should be rejected meaning these variables are significant. But in the case of IR null hypothesis can't be rejected because it has a higher corresponding probability than requirements. Besides, R-square is very high, F-statistics is very significant. For strengthening the decision taken from the results of the regression model several other tests should be run.

5.6. Johansen Cointegration Model

Hypothesis:

Null H0: No cointegration

ALT H1: There is cointegration

Table 08: Output of Johansen Cointegration Tests.

Maximum ranks	**Parms**	**LL**	**eigenvalue**	**trace statistics**	**5% critical value**
0	105	212.19	.	115.09	68.52
1	114	236.24	0.58	66.99	47.21
2	121	254.29	0.48	30.88	29.68
3	126	265.04	0.32	9.39*	15.41
4	129	269.67	0.15	0.13	3.76
5	130	269.74	0.00		
Maximum ranks	Parms	LL	eigenvalue	trace statistics	5% critical value
0	105	212.19	.	48.10	33.46
1	114	236.24	0.58	36.11	27.07
2	121	254.29	0.48	21.49	20.97
3	126	265.04	0.32	9.26	14.07
4	129	269.67	0.15	0.13	3.76
5	130	269.74	0.00		

Model one has enabled me to compare trace statistics and critical values. Here in ranks 0, 1, and 2, the trace statistics are higher than the critical

value which means the rejection of the null hypothesis. But in rank 3, the value of trace statistics is lower than the critical value which denotes the existence of long-run cointegration among variables. Similarly, Model two has enabled me to compare max statistics and critical values. Here in ranks 0, 1, and 2, the max statistics are higher than the critical value which means the rejection of the null hypothesis. But in rank 3, the value of max statistics is lower than the critical value which denotes the existence of long-run cointegration among variables. Itis observed that there is three cointegration among variables that have been double-checked using two models of Johansen cointegration tests. This denotes the existence of a long-run association of the variables. This existence of cointegration has enabled me to go for the VECM model.

5.7. Johansen Cointegration Model

Hypothesis:

Null H0 = lagged Xi does not cause Xi

ALT H1 = lagged Xi cause Xi

Table 09: Output of Granger Causality Tests.

Granger causality Wald tests (lag 02), (lag 05)							
Equation	Excluded	chi2		df		Prob>chi2	
ddsex	dmsply	0.26	7.12	2	5	0.88	0.21
ddsex	dcpi_inf	1.07	4.16	2	5	0.58	0.53
ddsex	dsbwadr_ir	3.94	6.30	2	5	0.14	0.28
ddsex	derusd	1.25	8.27	2	5	0.54	0.14
ddsex	ALL	6.24	31.88	8	20	0.62	0.05
dmsply	ddsex	2.37	14.06	2	5	0.31	0.02
dmsply	dcpi_inf	1.71	9.54	2	5	0.42	0.09
dmsply	dsbwadr_ir	1.93	7.97	2	5	0.38	0.16
dmsply	derusd	4.98	14.50	2	5	0.08	0.01
dmsply	ALL	10.15	40.47	8	20	0.26	0.00
dcpi_inf	ddsex	0.20	7.21	2	5	0.91	0.21
dcpi_inf	dmsply	1.44	4.93	2	5	0.49	0.42
dcpi_inf	dsbwadr_ir	3.72	3.99	2	5	0.16	0.55
dcpi_inf	derusd	1.50	4.16	2	5	0.47	0.53
dcpi_inf	ALL	6.44	18.87	8	20	0.60	0.53
dsbwadr_ir	ddsex	3.91	3.50	2	5	0.14	0.62

dsbwadr_ir	dmsply	8.55	12.26	2	5	0.01	0.03
dsbwadr_ir	dcpi_inf	2.92	3.55	2	5	0.23	0.62
dsbwadr_ir	derusd	2.85	4.99	2	5	0.24	0.42
dsbwadr_ir	ALL	21.95	31.74	8	20	0.01	0.05
derusd	ddsex	1.34	4.79	2	5	0.51	0.44
derusd	dmsply	5.72	3.27	2	5	0.06	0.66
derusd	dcpi_inf	0.37	3.91	2	5	0.83	0.56
derusd	dsbwadr_ir	0.32	8.38	2	5	0.85	0.14
derusd	ALL	8.05	23.76	8	20	0.43	0.25

Here variables are meant by Xi. Here, under 2 lag we only found that money supply granger causes interest rates, and all variables granger cause interest rate. While lag is 5 money supply granger cause DSEX and money supply granger cause exchange rate. Besides lag 2 all variables granger cause money supply and interest rate. This means there is bidirectional causality between the interest rate and money supply and unidirectional causality between all variables to money supply using 2 lags in the granger causality test. Then using three lags in granger causality tests showed the existence of bidirectional relationships between the interest rate and exchange rate with money supply and unidirectional causality to money supply and interest rate.

6. CONCLUSION AND POLICY IMPLICATION

This study examines the relationships between stock price and selected macroeconomic variables. Here the stock price is represented by Dhaka Stock Exchange broad market index named DSEX. The independent variables are broad money supply (m2), point to point cpi inflation rate, interest rate proxied by scheduled banks weighted average deposit rate and USD exchange rates. To estimate the relationships unit root test has been run before the first difference and after the first difference with three equations including trends, trends, and intercept and without trend and intercepts. Then the multivariate Regression Model computed on the Standard Ordinary Linear Square (OLS) method and to make more dependable of the output variables diagnostics has been tested along with testing heteroscedasticity, Durbin-alternative tests, and Bruesch-Godfrey LM tests. After that Johansen cointegration test has been run to measure the cointegration of the dependent variable with independent variables. Vector Error Correction Model (VECM) can't be run without the existence of cointegration. Then the VECM model has been run and

strengthening the decisions Lagrange Multiplier Tests and Jarque-Bera tests have been examined. Finally, the granger casualty test has been examined whether any variable causes another variable or all variables together can cause another individual variable. ADF tests the first model revealed the non-stationarity of data while the second model revealed the stationarity of data. The multivariate regression using ordinary least square methods revealed the significance of all variables except interest rate. Then cointegration is found by using Johansen cointegration tests which revealed the feasibility to go for the VECM model. The non-existence of the short-run cause of independent variables to the dependent variable has been revealed by this model. Al last bidirectional causality has been found between the interest rate and money supply and unidirectional causality has been found between all variables to money supply using 2 lags in the granger causality test.

Then using three lags in granger causality tests bidirectional relationships have been found among interest rate and the exchange rate with money supply and unidirectional causality has been found for money supply and interest rate. Under the existing condition, this can be assessed that investors will have a notion of switching between fixed income asset class and capital market investment which depends on the risk-adjusted return. Money supply is the most influential macroeconomic variable didn't influence the stock price changes meaning that there is informational inefficiency in the Bangladesh capital market which is an exception for an efficient market. This informational inefficiency of our stock market is the first and most significant barrier to the development and implementation of trading rules.

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