Int. J. Manag. Bus. Res., 3 (3), 269-279, Summer 2013

The Effects of Interest Rates Volatility on Stock Returns: Evidence from Bangladesh

* ***D. Muktadir-Al-Mukit***

Faculty of Business Administration, Eastern University, Dhaka, Bangladesh

ABSTRACT:
The paper investigates the effects of interest rates on stock market performance by using monthly time series data for the economy of Bangladesh over the period of 1991 to 2012. A wide range of econometric techniques have been employed to analyze the relationship between the interest rate and stock market return. The study reveals a stable and significant long run relationship between the variables. By employing Cointegration technique it is observed that in the long run, a one percent increase in interest rate causes 13.20 % decrease in market index. The estimated error correction coefficient indicates that 0.12 percent deviation of stock returns are corrected in the short run. Impulse response function of the study also affirms the negative relationship between the variables. The result of Variance decompositions suggests that about 99.57 % of the variation in stock market returns is attributable to its own shock which implies that stock market returns are largely independent of the other variables in the system. Finally, Granger causality analysis suggests the existence of a unidirectional causality from interest rate to market index.

Keywords: *Stock market, Cointegration, Granger causality, Interest rate, DGEN index, Bangladesh*

INTRODUCTION

As a key component of financial system, stock market plays a crucial role to boost the economic growth of the country. A well functioning stock market is representative of financial strength of any economy. The functioning of stock market depends on a number of economic factors and investors are always keen to know the impact of these factors on stock prices. Among a number of economic variable interest rate is considered to be key one which exerts a significant influence on stock prices. Interest rate risk is an important financial and economic factor affecting the value of common stocks (Joseph et al., 2006).This paper investigates the dynamic effects of changes in interest rates on the stock market return in Bangladesh.

Bangladesh is demonstrating its increasing importance not only to the economy of this region but also to the economy of many countries of the world. Rapid development of the country's financial system is noticeable after initiating the financial sector reforms during 1990s. The financial sector of Bangladesh consists of 52 scheduled commercial banks, 32 Non Banking Financial Institutions (NBFIs), 62 insurance companies, 599 Microfinance Institutions (MFIs) and 2 stock markets (source: Bangladesh Bank website, www.bangladesh-bank.org). As a part of financial system, stock market of Bangladesh is playing a vital role for the economic development of the country for a

***Corresponding Author, Email:** *mukit@easternuni.edu.bd*

long period of time. After establishing in 1954, country's first stock exchange, Dhaka Stock Exchange (DSE) commenced its operation in 1956. On April, 2013 there are total 292 companies listed in DSE with the total market capitalization of Taka 2166.57 billion. But besides facilitating for efficient functioning, the economic reform also brings greater exposure of financial markets to economic and financial risks. So, it is imperative to determine the effects of different variables on stock market return in Bangladesh particularly the impact of interest rate movement. Recently stock market of Bangladesh has seen a massive volatile situation where market index fell from peak 8918 point in 5 December, 2010 to 4220 point in 31 December, 2012 showing a market correction of around 53% within two years. Especially after the recent stock market crash in Bangladesh, the issue of the impact of different causative factors toward market performance has been gained much more attention from researchers and policymakers. Financial theory suggests that interest rate is one of the macro economic factors that should systematically affect stock market return (Chen et al., 1986). Thus, interest rate is considered as one of the most significant determinants of the stock prices (Modigliani and Chon, 1979). This paper attempts to analyze the relationship of stock market index with interest rate volatility in Bangladesh between 1991 and 2012 using monthly time series data.

Literature Review

The dynamic relationship between market index with interest rate is a matter of study to the researchers over a long period of time. But a very few studies can be found showing the effect of interest rate on stock market return in Bangladesh.

It is assumed by many researchers that the stock prices and interest rates are negatively correlated. A low interest rate leads higher capital flows to the stock market in expectation for a higher rate of return where a high interest rate encourages more savings in banks and consequently reduces the flow of capital to the stock markets (Modigliani, 1971; Mishkin, 1977). A reduction in interest rates leads to lower cost of borrowing. People tend to take more loans at a lower cost because of reduction of interest rate followed by expansionary monetary policy which can be invested in stock market. Besides, a decrease in interest rate make the investment in fixed income securities less attractive and hence people move their money from the bond market to the equity market. Both actions cause the stock prices to boost up. Thus, an increase in interest rate causes stock prices to decline and a decline in interest rates causes stock prices to rise (Smirlock and Yawitz, 1985; Hardouvelis, 1987; Thorbecke, 1997). Chen et al. (1986) examined the effect of a set of economic forces on stock return and found that the changes in aggregate production, expected and unexpected inflation, the short-term interest rates and the risk premium have systematic influence on stock return. Hasan and Javed (2009) analyzed the relationship between equity prices of Pakistan stock market with the money supply, foreign exchange rate, Treasury bill rate, and the CPI. They found that the relationship of the interest rate with equity market returns is negative. The result of the GARCH model of Leon's (2008) study shows a negative relationship between Korean Stock Price Index 200 (KOSPI) and Negotiable Certificates of Deposits (Korea NCD 91-Day yield). The study of Adam and Tweneboah (2008) and Coleman and Tettey (2008) for the country of Ghana; the study of Nikiforos (2006) for the economy of United States and the study of Liu and Shrestha (2008) for the economy of China show inverse relationship between stock return and interest rate. Arango et al. (2002) empirically examined the relationship of the share prices on the Bogota stock market with interbank loan interest rate in Colombia and found inverse and nonlinear relationship between the study variables. This negative relationship also be found in other researchers' recent studies (Kim, 2003; Nissim et al., 2003; Hsing, 2004; Khrawish et al., 2010).

The pattern of stock returns are associated with monetary policy decisions. A decreased discount rate leads to increase in long term stock returns which are higher than returns followed by increased discount rate (Jensen and Johnson , 1995). The study of Fama and Schwert (1977) shows an inverse relationship between common stock returns and Treasury bill rates. Booth and Booth (1997) used two variables of monetary policy. One is discount rate and another is federal fund rate. The findings of their study show that a decrease in monthly return of both

large and small bond and stock portfolio is associated with a restrictive monetary policy. Many researchers confirmed these findings (Patelis 1997 and Thorbecke, 1997). Some studies find a positive association between these two variables. The study of Elton and Gruber (1988) reveals a positive relationship between stock prices and short-term interest rates. This positive relationship is supported by Keynesian hypothesis based on a sticky price model. Keynes shows that stock price will be affected by money supply when only it changes the expectations about future Fed policy or changes the future interest rates (Sellin , 2001). Some recent studies confirm this findings of positive relationship (Ologunde et al., 2006; Mohamed et al., 2008). Harasty and Roulet (2000) explored research on 17 developed countries and demonstrated that stock prices are cointegrated with the long term interest rate in each country except Italy. In recent period a number of researchers show cointegrating relationship between interest rate and stock return in their studies (Omran, 2003; Maysami et al., 2004; Subramanian, 2008 ; Vardar et al., 2008; Pallegedara, 2012). The study of Shah et al. (2012) demonstrates a unidirectional causality from interest rate to market index for the economy of Pakistan. Similar causality is found in the study of Cifter and Ozun (2007) for the economy of Turkey. Though Pallegdara (2012) found no short run causal relationships between stock market returns and short term interest rate. In their study using daily data, Joseph and Vezos (2006) conclude that the stock returns are highly sensitive to interest rate changes. But Kurihara and Nezu's (2006) study shows that there is insignificant relationship between Japanese stock prices and interest rate.

Some researchers attempted to determine the relationship of interest rate with stock returns in case of Bangladesh. Imam and Amin (2004) examined the association between DSE stock index and a set of macroeconomic variables comprising money supply, GDP, interest rate, 91 day T-bill rate and Industrial production index. They found a unidirectional causality from interest rate change to stock market return. The panel regression of Alam and Uddin's (2009) study for fifteen developed and developing countries including Bangladesh shows existence of negative and significant relationship between interest rate and stock prices. Banerjee and Adhikarys (2009) attempted to determine the dynamic effects of changes in interest rates a on the stock market return in Bangladesh and the results from VAR models suggest independence between the variables.

RESEARCH METHOD

The study investigates the relationship between market index and interest rate. The data set comprises of monthly time series data for Bangladesh over the total 264 sample periods of January, 1991 to December, 2012. The sources include 'Monthly Economic Trends' published by Bangladesh Bank and Dhaka Stock Exchange website (dsebd.org). All data have been processed by using E-Views 7.0 software.

Market Index: The DSE General (DGEN) Index has been chosen as the measure of stock market performance which captures the daily price movements of equities at the stock exchange.

Interest Rate: Interest rate is proxied by the Schedule banks' weighted average interest rates on saving deposit.

The summary descriptive statistics of the study variables are shown in table 1.

Table 1: Summary statistics of the study variables

	DGEN index	Interest Rate
Mean	1760.432	8.245610
Median	845.3600	8.250000
Maximum	8602.440	12.09000
Minimum	286.0400	5.220000
Std. Dev.	1797.369	1.496463
Skewness	1.714407	0.545254
Kurtosis	5.206919	3.578626
Jarque-Bera	182.8999	16.76416
Probability	0.000000	0.000229
Observations	264	264

The structural model to estimate the relationship between log transformed variables is stated below:

$$LY_t = \beta_0 + \beta_1 LINT + \varepsilon_t$$

Where,

Y is the natural log of DSE General (DGEN) Index
LINT is the natural log interest rate

β_0 and β_i are the parameters known as the intercept and slope coefficient and ε is the classical random disturbance term.

To check for non-stationarity property, the data are subjected to Augmented Dickey and Fuller test (ADF test). The following regression is for ADF test purpose:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_i \Sigma \Delta Y_{t-i} + \varepsilon_t$$

Where ε_t is a white noise error term and $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$ and so on are the number of lagged difference term which is empirically determined. Using Schwarz Information Criterion (SIC) the lag length is selected automatically by E-views software.

Our next step is to determine whether the variables have a stable and non-spurious cointegrating relationship among themselves. For the purpose of testing Cointegration we have chosen the Johansen procedure and lag order is selected on the basis of Schwarz Bayesian Criteria (SBC). The Johansen approach of Cointegration test is based on the following Vector Autoregressive model:

$$Y_t = \phi D_t + \Pi_t Y_{t-1} + ... + \Pi_k Y_{t-k} + \varepsilon_t$$

Where D_t is deterministic term, Y_t is an (n x 1) vector of I (1) variables, Π_t is (n x n) matrix of parameters and ε_t is (n x 1) vector of white noise error.

If there is at least one cointegrating relationship among the variables, then the causal relationship among these variables can be estimated by the Vector Error Correction Model (VECM) which provides information about the speed of adjustment to long run equilibrium avoiding the spurious regression problem (Engle and Granger, 1987).The Error Correction Model (ECM) is based on following regression:

$$\Delta Y_t = \alpha + \beta \Delta X_t + \beta U_{t-1} + \varepsilon_t$$

Where U is the one period lagged value of the residual and the error correction component of the model which measures the speed at which the prior deviations from equilibrium are corrected and Δ represents first-differences operator.

After VECM model is estimated, then we employ Variance Decompositions to investigate the behavior of an error shock to each variable on its own future dynamics as well as on the future dynamics of the other variables in the VECM system. Impulse response analysis is also carried out by giving a shock of one standard deviation (± 2 S.E. innovations) to the interest rate to portraits the duration of their effects on the stock market of Bangladesh.

The final step of our analysis is to test for causality between market index and interest rate in the long run based on Granger causality test. The test involves estimating the following regressions to examine Granger causality:

(1)

$$Y_t = \sum_{i=1}^{n} \alpha_i X_{t-i} + \sum_{j=1}^{n} \beta_j Y_{t-j} + \varepsilon_{1t}$$

(2)

$$X_t = \sum_{i=1}^{m} \lambda_i X_{t-i} + \sum_{j=1}^{m} \delta_j Y_{t-j} + \varepsilon_{2t}$$

Where it is assumed that the disturbance ε_{1t} and ε_{2t} are uncorrelated. First regression assumes that current value of Y is related with the past values of X; and second regression proposes that current value of X is related with the past values of Y. The hypothesis of Granger causality test is:

H0: αi = 0: X does not Granger cause Y
vs.

H1: αi ≠ 0: X Granger causes Y

ANALYSIS AND FINDINGS

Stationarity Test

Table 2 shows the results of ADF test statistic used to check the non-stationarity property of the data and to determine how many times the

variable needs to be differenced to result in a stationary series.

The results in table 2 shows that ADF tests fail to reject the null of non-stationary for all of the variables at level. After first differencing the result shows that LDGEN and LINT became stationary at the 1% significance level, implying that all the variables are first order integrated I(1). Figure 1 shows stationarity trend after first differencing the variables.

Table 2: Results of ADF test

Variables	ADF Test Statistic	
	Level	First difference
LDGEN	-2.218732	-13.84157***
LINT	-2.778688	-6.775210***
Test Critical value		
1% level	-3.993471	-3.455193
5% level	-3.427070	-2.872370
10% level	-3.136819	-2.572615

Note: *** indicates statistically significant at the 1% level.

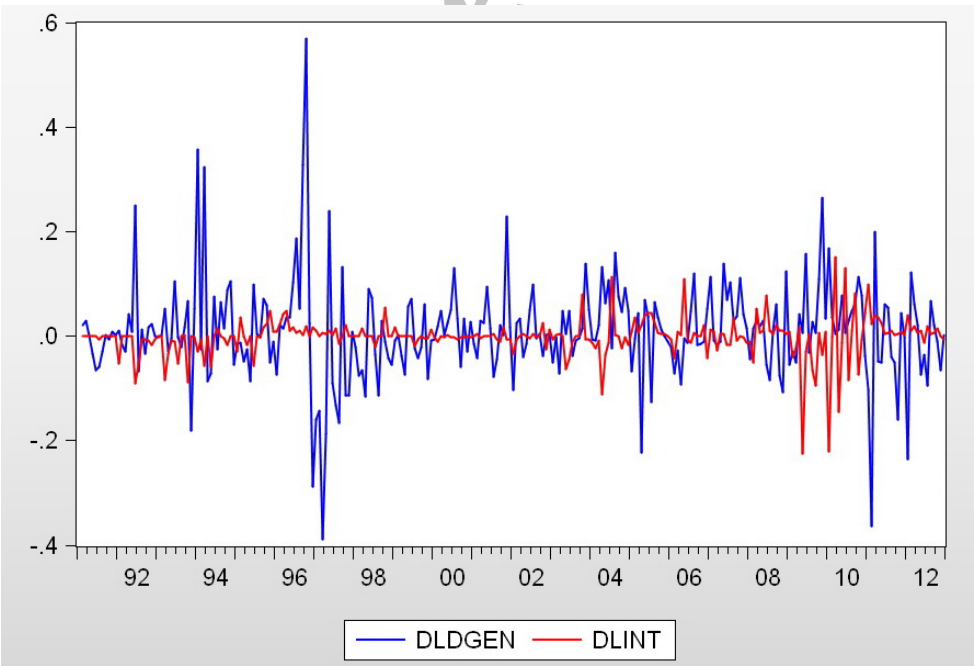

Figure 1: Trend with stationary

The Ordinary Least Square (OLS) Regression Model

The OLS result has been presented in the table 3. The estimation of the equation by direct OLS gives the following one:

LDGEN= 11.16 - 1.96 LINT

The slope coefficient of independent variable is statistically significant at 1 % level and shows a negative relationship. The result is implying that in Bangladesh, a one percent increase in interest rate results 1.96 % decrease in market return. Moreover, F = 48.10 and P = 0.000 imply that the regression model significantly fits the data. But our autocorrelation assessment based on Breusch-Godfrey Serial Correlation LM Test indicates a biasness of previous estimation. The result of Breusch-Godfrey Serial Correlation LM Test is presented in table 4.

The null hypothesis of the LM test is that there is no serial correlation up to lag order m, where m is equal to 2 in this case and the Obs*R-squared statistic is the Breusch-Godfrey LM test statistic. The result indicates that we can reject the null hypothesis of no serial auto correlation at 1% significance level. So there exist autocorrelation among the variables and the previously estimated model is an indication of spurious regression.

Testing Cointegration

As the variables are considered to be I(1), the Cointegration method is appropriate to estimate the long run relationship between the variables. To explore the number of cointegrating vectors, Maximal Eigenvalue and Trace statistics both are used and shown in table 5.

The Trace statistic and Maximal Eigen statistic both identified one cointegrating vector. The presence of Cointegration implies the existence of a stable long run relationship between interest rate and market index. The normalized cointegrating coefficients are reported in table 6. This vividly shows that in the long run interest rate has a negative impact on market index. The relationship is found statistically significant at the 10% level. The result is implying that in Bangladesh in the long run, a one percent increase in interest rate contributes 13.20 % decrease in market index.

Table 3: OLS Regression results

	Coefficient	Std. Error	t-Statistic	P-value
C	11.16112	0.593048	18.81994	0.0000
LINT	-1.958894	0.282438	-6.935666	0.0000
R-squared	0.155121	**Mean dependent var**		7.062828
Adjusted R-squared	0.151896	**S.D. dependent var**		0.889428
F-statistic	48.10347	**Durbin-Watson stat**		0.018227
Prob (F-statistic)	0.000000			

Table 4: Breusch-Godfrey serial correlation LM test

F-statistic	6652.229	Prob. F	0.0000
Obs*R-squared	258.9397	Prob. Chi-Square(2)	0.0000

Table 5: Unrestricted cointegration rank test

(Trace)

Hypothesized		Trace Statistic	0.05 Critical Value	P-value**
No. of CE(s)	**Eigenvalue**			
None *	0.058024	15.83530	15.49471	0.0444
At most 1	0.002565	0.652284	3.841466	0.4193
(Maximum Eigenvalue)				
Hypothesized		**Max-Eigen Statistic**	**0.05 Critical Value**	**P-value ** **
No. of CE(s)	**Eigenvalue**			
None *	0.058024	15.18301	14.26460	0.0357
At most 1	0.002565	0.652284	3.841466	0.4193

Trace and Max-eigenvalue test both indicate 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 6: Cointegrating equation

Cointegrating Equation	CointEq1
LDGEN(-1)	1.000000
LINT(-1)	-13.20467* (4.88824) [-2.70131]
C	20.51601

Note: i) Standard errors in ( ) & t-statistics in [ ]
ii) * indicates statistically significant at the 10% level

Table 7: Error correction model

Vector Error Correction Estimates Sample (adjusted): 1991M04 2012M12 Included observations: 261 after adjustments		
Error Correction:	**Δ LDGEN**	**Δ LINT**
ECM_{t-1}	0.001185 [0.54408]	0.002497 [3.03239]
Δ LDGEN(-1)	0.145258 [2.27701]	-0.014603 [-0.60553]
Δ LINT(-1)	-0.101658 [-0.62126]	-0.000101 [-0.00163]
C	0.008271 [1.36752]	-0.000776 [-0.33924]

Note: i) Figures in parenthesis represent the t-statistics

Vector Error Correction Model

The stable long run relationship between the variables affirmed by Cointegration test may not exist in the short run .Thus Vector Error Correction Mechanism (VECM) has been employed to determine the level of short run adjustments towards long run equilibrium relationship between the variables.
The results of VECM were shown in table 7.

The estimated error correction coefficient indicates that about 0.12 percent deviation of the market index from its long run equilibrium level is corrected each period in the short run, while the gaps in the interest rate close by about 0.25 percent.

Variance Decompositions and Impulse Response Function

We employ Variance Decomposition to measure the percentage of forecast error of variation that is explained by another variable within the short-run dynamics and interactions. The results of Variance Decompositions are presented in table 8.

The results of Variance Decompositions show that the dynamic contrast in market index explains 100% of the components of variation in the first period when the shock by a standard deviation of one in the variable itself, and in the second period it goes to 99.91 % of the error prediction of the variability. During the second period 0.08 % variation in market index is due to variation in interest rate. The increase in the proportion attributable to variation in interest rate continues to fluctuate with a tendency to increase that up to about 0.43 % in the period of the twelfth. Figure 2 shows impulse responses. It shows the impact of a one standard deviation generalized innovation in the interest rate on the stock market index of Bangladesh. The effect of a shock to the interest rate on the market index was negative throughout 12 month horizon.

Table 8: The results of variance decompositions

Period	S.E.	LDGEN	LINT
1	0.096812	100.0000	0.000000
2	0.147953	99.91882	0.081184
3	0.185178	99.82860	0.171398
4	0.216195	99.78124	0.218764
5	0.243540	99.74918	0.250822
6	0.268234	99.72034	0.279656
7	0.290934	99.69333	0.306674
8	0.312085	99.66772	0.332282
9	0.331981	99.64296	0.357041
10	0.350833	99.61871	0.381287
11	0.368800	99.59482	0.405182
12	0.386003	99.57118	0.428822

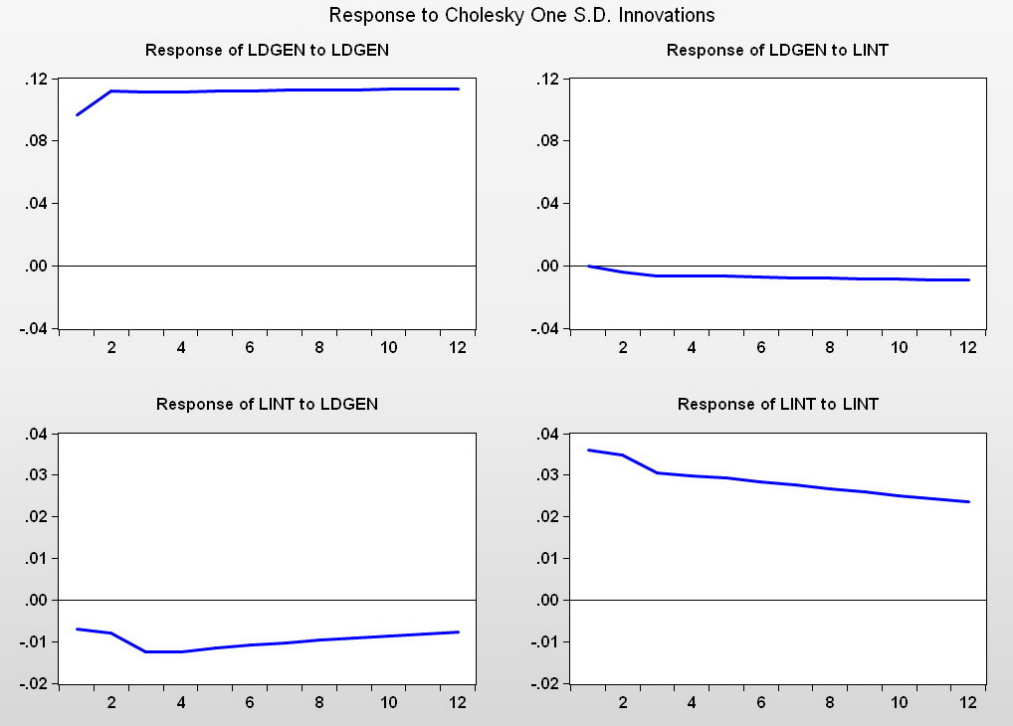

Figure 2: Impulse response function

Table 9: Granger causality test

Null Hypothesis	F-Statistic	P-Value	Granger Causality
LINT does not Granger Cause LDGEN	1.83678	0.0926*	Yes
LDGEN does not Granger Cause LINT	0.95768	0.4546	No

Note: * indicates statistically significant at the 10% level

Granger Causality Test

Our final step of analysis is to test for causality between market index and interest rate in the long run. The results are presented in table 9.

Granger-causality results suggest that the null hypotheses that LINT does not Granger cause LDGEN is rejected at 10% significance level which states that there is a uni-directional causality running from interest rate to market index.

CONCLUSION

This study attempts to investigate the predictive power of interest rate volatility on the returns of stock market in Bangladesh. The results of unit root test show that all the data series of the variables are integrated of order one. Our Johansen procedure of Cointegration test suggests at least one cointegrating relationship between the variables. The result of the analysis shows that in the long run interest rate has a negative and significant impact on stock prices where about 0.12 percent deviation of the market

index from its long run equilibrium level is corrected each period in the short run. Evidence from Granger causality analysis suggests that there exists a unidirectional causality from interest rate to market index.

Investors should consider the systematic risks exposed by the interest rates during constructing their portfolios and making investment decisions. It is suggested that regulators and policymakers should consider the effect of macroeconomic variables especially interest rate before formulating different economic policies. The findings of the study can be incorporated in market policies in the process of developing a vibrant capital market for ensuring the stable economic growth of the country.

Though the study reveals a long-run negative relationship between the variables with a unidirectional causality from changes in interest rate to the stock market of Bangladesh, but the policy to influence the stock market by controlling interest rate may not be fully effective due to inefficient functioning of capital market and lack of debt market. So, it is suggested that before implementing the policy the authority should emphasize on the development of a vibrant and efficient capital market.

REFERENCES

Adam, A. M. and Tweneboah, G. (2008). Do Macroeconomic Variables Play Any Role in the Stock Market Movement in Ghana? MPRA Paper 9301, University Library of Munich, Germany.

Alam, M. M. and Uddin, M. G. S. (2009). Relationship between Interest Rate and Stock Price: Empirical Evidence from Developed and Developing Countries. *International Journal for Business and Management*, 4 (3), pp. 43-51.

Arango, L., Gonzalez, A. and Posada, C. (2002). Returns and Interest Rate: A Nonlinear Relationship in the Bogota Stock Market. *Applied Financial Economics*, 12 (11), pp. 835-842.

Banerjee, P. K. and Adhikary, B. K. (2009). Dynamic Effects of Changes in Interest Rates and Exchange Rates on the Stock Market Return in Bangladesh. *Ritsumeikan Journal of Asia Pacific Studies*, 25, pp. 119-133.

Booth, J. and Booth, L. (1997). Economic Factors, Monetary Policy, and Expected Returns on Stocks and Bonds. *Economic Review*, Federal Reserve Bank of San Francisco, 2, pp. 32-42.

Chen, N., Roll, R. and Ross, S. (1986). Economic Forces and the Stock Market. *Journal of Business*, 59 (3), pp. 383-403.

Cifter, A. and Ozun A. (2007). Estimating the Effects of Interest Rates on Share Prices Using Multi-Scale Causality Test in Emerging Markets: Evidence from Turkey. MPRA Paper No: 2485. University Library of Munich, Germany.

Coleman, A. K. and Tettey, K. F. A. (2008). Impact of Macroeconomic Indicators on Stock Market Performance: The Case of the Ghana Stock Exchange. *Journal of Risk Finance*, 9 (4), pp. 365- 378.

Elton, E. J. and Gruber, M. J. (1988). A Multi-Index Risk Model of the Japanese Stock Market. *Japan and the World Economy*, 1 (1), pp. 2 1-44.

Engle, R. and Granger, C. (1987). Co-Integration and Error-Correction: Representation, Estimation and Testing. *Econometrica*, 55 (2), pp. 251-276.

Fama, E. F. and Schwert, G. W. (1977). Asset Returns and Inflation. *Journal of Financial Economics*, 5 (November), pp. 115-46.

Harasty, H. and Roulet, J. (2000). Modeling Stock Market Returns. *Journal of Portfolio Management*, 26 (2), pp. 33-46.

Hardouvelis, G. A. (1987). Macroeconomic Information and Stock Prices. *Journal of Economics and Business*, 39 (2), pp. 131-140.

Hasan, A. and Tarij, J. M. (2009). An Empirical Investigation of the Causal Relationship among Monetary Variables and Equity Market Returns. *The Lahore Journal of Economics*, 14 (1), pp. 115-137.

Hsing, Y. (2004). Impacts of Fiscal Policy, Monetary Policy, and Exchange Rate Policy on Real GDP in Brazil: A VAR Model. *Brazilian Electronic Journal of Economics*, 6 (1).

lmam, M. O. and Amin, A. S. M. M. (2004). Volatility in the Stock Return: Evidence from Dhaka Stock Exchange. *Journal of the Institute of Bankers Bangladesh*, 51 (1), pp. 1-8.

Jensen, G. and Johnson, R. (1995). Discount Rate Changes and Security Returns in the US, 1962-1991. *Journal of Banking and Finance*, 19 (1), pp. 79-95.

Joseph, N. A. and Vezos, P. (2006). The Sensitivity of US Bank's Stock Returns to Interest Rate and Exchange Rate Changes. *Managerial Finance*, 32 (2), pp. 182-199.

Khrawish, H. A., Siam, W. Z. and Jaradat, M. (2010). The Relationships between Stock Market Capitalization Rate and Interest Rate: Evidence from Jordan. *Business and Economic Horizons*, 2 (2), pp. 60-66.

Kim, K. H. (2003). Dollar Exchange Rate and Stock Price: Evidence from Multivariate Cointegration and Error Correction Model. *Review of Financial Economics*, 12 (3), pp. 301-313.

Kurihara, Y. and Nezu, B. E. (2006). Recent Stock Price Relationships between Japanese and US Stock Markets. *Studies in Economics and Finance*, 23 (3), pp. 211 – 226.

Leon, N. K. (2008). The Effects of Interest Rates Volatility on Stock returns and Volatility: Evidence from Korea. *Euro Journal of Finance and Economics*, 14, pp. 285-290.

Liow, K. H. and Huang, Q. (2004). Interest Rate Risk and Time-Varying Excess Returns for Property Stocks: An Asset Pricing Perspective. Working Paper, Department of Real Estate, NUS.

Liu, M. H. and Shrestha, K. (2008). Analysis of the Long Term Relationship between Macroeconomic Variables and the Chinese Stock Market Using Heteroscedastic Cointegration. *Managerial Finance*, 34 (11), pp. 744-755.

Mayasami, R. C., Howe, L. C. and Rahmat, M. A. (2004). Relationship between Macroeconomic Variables and Stock Market Indices: Cointegration Evidence from Stock Exchange of Singapore's All-S Sector Indices. *Journal Pengurusan*, 24, pp. 47-77.

Mishkin, F. S. (1977). What Depressed the Consumer? The Household Balance Sheet and the 1973-1975 Recession. *Brookings Papers on Economic Activity*, 1, pp. 123-164.

Modigliani, F. (1971). Monetary Policy and Consumption: Linkages via Interest Rate and Wealth Effects in the FMP Model. Consumer Spending and Monetary Policy: the Linkages, Federal Reserve Bank of Boston Conference Series, 5.

Modigliani, F. and Cohn, R. A. (1979). Inflation, Rational Valuation, and the Market. *Financial Analysis Journal*, 35 (2), pp. 24–44.

Mohamed, E. H. A., Jawadi, F. and Nguyen, D. K. (2008). International Stock Return Linkages: Evidence from Latin American Markets. *European Journal of Economics, Finance and Administrative Sciences*, 11, pp. 57-65.

Nikiforos T. L. (2006). Dynamic Interactions among the Stock Market, Federal Funds Rate, Inflation, and Economic Activity. *The Financial Review*, 41(4), pp. 513-545.

Nissim, D. and Penman, S. (2003). The Association between Changes in Interest Rates, Earnings, and Equity Values. *Contemporary Accounting Research*, 20 (4), pp. 775-804.

Ologunde, A. O., Elumilade, D. O. and Asaolu, T. O. (2006). Stock Market Capitalization and Interest Rate in Nigeria: A Time Series Analysis. *International Research Journal of Finance and Economics*, 4, pp.154-166.

Omran, M. (2003). Time Series Analysis of the Impact of Real Interest Rates on Stock Market Activity and Liquidity in Egypt: Co-integration and Error Correction Model Approach. *International Journal of Business*, 8 (3), pp. 359-374.

Pallegedara, A. (2012). Dynamic Relationships between Stock Market Performance and Short Term Interest Rate Empirical Evidence from Sri Lanka. MPRA Paper 40773, University Library of Munich, Germany.

Patelis, A. D. (1997). Stock Return Predictability and the Role of Monetary Policy. *The Journal of Finance*, 2 (5), pp. 1951-1972.

Sellin, P. (2001). Monetary Policy and the Stock Market: Theory and Empirical Evidence. *Journal of Economic Surveys*, 15 (4), pp. 491-541.

Shah, A., Rehman, J. U., Kamal,Y. and Abbas, Z. (2012). The Interest Rates-Stock Prices Nexus in Highly Volatile Markets: Evidence from Pakistan. *Journal of Basic and Applied Scientific Research*, 2 (3), pp. 2589-2598.

Smirlock, M. and Yawitz, J. (1985). Asset Returns, Discount Rate Changes, and Market Efficiency. *Journal of Finance*, 40 (4), pp.1141-1158.

Subramanian, U. (2008). Cointegration of Stock Markets of East Asia. *European Journal of Economics, Finance and Administrative Sciences*, 14, pp. 84-92.

Thorbecke, W. (1997). On Stock Market Returns and Monetary Policy. *Journal of Finance*, 52 (2), pp. 635-654.

Vardar, G., Aksoy, G. and Emre, C. (2008). Effects of Interest and Exchange Rate on Volatility and Return of Sector Price Indices at Istanbul Stock Exchange. *European Journal of Economics*, Finance and Administrative Sciences, 11, pp. 126-135.