The Relationship between Macro-Economic Variables and Stock Exchange Prices: A Case Study in Dhaka Stock Exchange (DSE) in Bangladesh

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Abstract

Macroeconomic indicators, such as money supply, inflation, exchange rate, trade balance, indicators of industrial production, are the basis for assessing the processes of growth and development of the country. Peculiarities of functioning of the exchange market also play an important role in the analysis of the country's development. Disclosure of the main purpose of the study involves the study of the relationship between macroeconomic indicators and stock prices on the Dhaka stock exchange (DSE) in Bangladesh. Methodological support of the work includes statistical methods (Granger causality test and Dickie fuller test), which allow to determine the causal relationship between macroeconomic indicators and prices on the stock exchange of Bangladesh. Empirical estimates of the study showed the absence of a causal relationship between macroeconomic indicators (money supply, industrial production index, exchange rate, inflation and trade balance) and stock prices in the form of a General index of all shares on the DAX stock exchange. The obtained results indicate that the macroeconomic evaluation cannot be used to predict prices on the stock exchanges in Bangladesh. The study postulates that the results of exchange activity also do not reflect the peculiarities of macroeconomic movement in the country. The author substantiates recommendations for regulatory authorities in terms of the formation of a set of measures to ensure the claim correlation of macroeconomic indicators of the country's development with prices on the stock market. It is stated that the results of the study will allow the government to take active measures to: overcome in the future the pressure of international trade, adjust the appropriate monitoring and fiscal policy, reduce any possible negative impact on the country's economy in the context of its further development.

Introduction

1.   Formation of Dhaka Stock Exchange Ltd. (DSE). Founded on 28th April 1954, DSE formerly known as East Pakistan Stock Exchange Ltd. which began its formal trading in 1956 and on 23rd June 1962 it was called as East Pakistan Stock Exchange. On 13th May 1964, its name was changed again, and it became known as Dacca Stock Exchange Ltd. In 1971(Post the Liberation War), the trading was stopped temporarily for five years which started again in 1976. DSE's all Share Price Index was begun on 16th September 1986 and on 1st November 1993 in accordance with IFC, the formula of calculating DSE All Share Price Index, was changed. On 10th August 1998, the automatic trading was launched in DSE. DSE is a public company which established and supervised under Company Act 1994, Security and Exchange Commission Act 1993, Security and Exchange Commission Regulation 1994, Security Exchange (Inside Trading) Regulation 1994. Presently, DSE has 195 members.

2.   Bangladesh Bank and Capital Market. Bangladesh Bank announced on Thursday, the 26th Jan 2012 that it does not count the capital market unproductive or risky as it moves to stem the flow of loans to barren sectors. Allah Malik Kazemi, senior consultant of the Bangladesh Bank Governor, made the remark while announcing the monetary policy for the second half of that fiscal year. Atiur Rahman said, "Flow of credit into unproductive sectors, including consumer loans, will be discouraged to keep adequate the flow of credit into private productive sectors." Atiur's consultant Kazemi replied, "We are not considering the capital market

as a risky sector." To clear his remarks, Kazemi added, "Risk in the capital market reduces if you invest carefully and responsibly. Income from the share market adds to GDP. Moreover, the companies increase production by collecting money from the market. So, I consider the sector as a productive sector". The capital market has been volatile amidst protests by retail investors for over a year. The retail investors have been blaming the Bangladesh Bank in many ways like lack of policy implementation for the big boom and sharp slide. The people demonstrated in front of the central bank several times near the Dhaka Stock Exchange demanding resignation of the central bank governor. After the Securities and Exchange Commission announced an incentives package, the market seemed to stabilize in December 2012. Although the share prices started to fall again from the beginning of January 2012. The DSE general index lost around 1,000 points in the first three weeks of January and it is continuing and it's become high risk for small investors.

Figure 1. The DSE general index

Source: completed by author.

Managing risks in the stock market is critical. Risk management is the process of measuring or assessing risk and then developing strategies to manage the risk while attempting to maximize prices. For this reason, causal relationships between financial elements should be determined by holistic risk management practices. In the context of risk management, both macro and micro economic indicators should be considered by risk managers. Also, causal relationship between these indicators with market risk factors should be analyzed in the process of risk management.

The search for the causal relationships and interactions among macroeconomic variables and stock exchange prices are important to the implementation of risk management systemically. Determination of both causal relationships and the interactions among them are useful to the minimization of the financial market risks. Stock exchange performance has attained significant role in global economics and financial markets, due to their impact on corporate finance and economic activity. For instance, Adjasi and Biekpe (2006) stated that stock exchanges enable firms to acquire capital quickly, due to the ease with which securities are traded. Stock exchange activity, thus, plays an important role in helping to determine the effects of macroeconomic activities. The review of literature contains considerable number of studies that examine the stock prices movements. Perhaps one important subject that has received increasing attention from economists, financial investors and policy makers is on dynamic effects of macroeconomic indicators on stock prices.

Objectives of the Study

The broad objective of the study is to find out the relationship between Macro-Economic Variables and Stock Exchange Prices of Dhaka Stock Exchange (DSE) in Bangladesh. However, the specific objectives are given below:

i.   To study the pricies of Dhaka Stock Exchange (DSE) represent any relationship with the country's macroeconomic variables?

ii.   To explore Macro-economic (fundamental) news cannot be used to predict the movement of Dhaka Stock Exchange (DSE) Prices in Bangladesh?

Bangladesh Market Vis-à-vis Global Markets

During the year 2010, the DJ Global Index experienced 12 percent gain, whereas Bangladesh capital market 83 percent outperformed all the developed markets like USA's 12 percent, UK's 9 percent and leading emerging markets like India's 17 percent, Hong Kong's 5 percent, China's -8 percent. This outstanding performance positioned the Bangladesh capital market in the top three performers of the world. On the other

hand, Bangladesh capital market has been exposed to greater risk since PE ratio rose from 19.9x to 29.71x from January 2010 to November, 2010. It was the highest in the Asian regional markets.

Price Earnings in Market

Towards the close of 2010, the average P/E in Bangladesh market for the stock index moved up to 29.71 times the expected anticipated earnings of index stocks, which was much higher than those noticed in the neighboring Asian pacific markets from emerging economies like India at 23.89, Hong Kong at 16, Sri Lanka at 24.69 and Singapore at 18 times. This increase reflects the bullish outlook among the investors. However, it was expected that PE ratio may be reduced to sustainable level considering earnings growth of the listed companies and steady growth of the overall economy.

Historical Year for Bangladesh Markets

The calendar year 2010 was a historic year in Bangladesh in which the stock market went through some breakthrough changes, to transform the functioning of capital markets in the country. These included:

i.   Removal of all the paper shares from the stock exchanges placement of same by move down transactions.

ii.   Introduction of Book Building method for the first time.

iii.   Making compulsory submission of quarterly Financial Statements by the listed companies, almost in line with other countries, to help investors gain more knowledge of the listed companies.

iv.   Fixing the tenure of Closed-end mutual funds.

v.   Allowing mutual funds to participate in the Book Building process.

vi.   Government started offloading of State-Owned Enterprises SOE's shares through a plan of disinvestment to ensure better funds generation by government.

vii.   Imposition of Ten percent OF Capital gain tax on institutional investor.

viii.   Highest number of SEC directives issued. These transformations have put the Bangladesh stock market on a fast forward track, particularly inviting institutional confidence in putting funds in Bangladesh stock markets.

The aforementioned activities have been practiced in order to launch ensure of higher corporate transparency, improved compliances issue both financial and non financial and its governance in place in markets. And the effort is on to improve continuously support of the governing agencies.

Review of Literature

Neither previous studies nor such tools have been used in the context of Bangladesh so far. Numbers of studies have been conducted to examine the affect of macroeconomic variables on stock market in the industrialized economies. Due to the enormous profit potentials, the study has extended to focus towards the analysis of stock markets for the developing economies.

An illustrative list of studies for developed economies includes Fama (1981, 1990), Famma and French (1989), Chen et al. (1986), Hamao (1988), Chen (1991), Thornton (1993), Kaneko and Lee (1995), Abdalla and Murinde (1997), Cheung (1998) and Darrat and Dickens (1999) found in the this area. These studies identify relationship of the macroeconomic factors such as industrial production, risk premiums, slope of the yield curve, inflation, interest rate, money supply and so forth as being important in explaining stock prices.

A few notable studies found in the literature for the developing economies such as Mookerjee and Yu (1997) and Maysami and Koh (2000) for Singapore, Kwon et al. (1997) and Kwon and Shin (1999) for South Korea, and Habibullah and Baharumshah (1996) and Ibrahim (1999) in Malaysia. By using bi-variate co-integration and causality tests, Mookerjee and Yu (1997) denoted significant interactions between money supply (M2) and foreign exchange reserves and stock prices in the case of Singapore. However, Maysami and Koh (2000) documented significant contribution of interest rate and exchange rate in the long-term relationship between stock prices in Singapore and its macroeconomic variables.

Evaluating the Korean equity market, Kwon et al. (1997) provide the evidence for the exchange rate, dividend yield, oil price and money supply as being significant relationship with macroeconomic factors. Friedman (1988) stated that monetary growth bumpiness increases the amount of supposed ambiguity where investor's expectations are based on price level of financial assets, Boyle (1990) proposed that changes in uncertainty of money supply will affect prices of financial instruments. Boyle (1990) suggests that changes in monetary uncertainty modify the stock prices risk premium to replicate the added expected prices that investors demand for assuming the risk of keeping stocks. In this way, monetary uncertainty is supposed to depict a negative association with stock prices.

Ghazali and Yakob (1997) looks at meeting two objectives firstly, to test for the subsistence of a correlation between the uncertainties linked with the uneven of growth in money supply and the equity market prices. Inflation is one the most important macroeconomic indicators to analyze the economic conditions of the economy. Few studies address the linkage among the stock market and inflation, Famma (1990) suggests that macroeconomic variables have projecting power for the stock exchange performance, although they do not consent to the anticipating authority of stock performance for the economy. Aggarwal (1981), Soenen and Hennigar (1988) in relationship of exchange rates and stock prices measured the relationship between these variables.

Literature evident that any change in the exchange rates would affect corporate foreign business and profitability that affect of firm equity prices. The type of change in equity prices would base on the global distinctiveness of the firm. Aggarwal (1981) noted strong positive relationship between the US dollar and US equity prices while Soenen and Hennigan (1988) found a considerable negative relationship. Index of industrial production indicates a measure of total economic activity in the economy and influences equity prices by effecting on future earnings (Fama, 1990). Mukherjee and Naka (1995) explored the relationship between industrial production and stock prices in Japan and found positive relationship between industrial production and stock exchange prices. Bhattacharya and Mukherjee (2002) and Nath and Samantha (2002) noted the type of causal relationship between stock prices and macro-economic factors in India. He applied methodology of Toda and Yamamoto for the period of 1992-1993 to 2000-2001, stating that change in industrial production affects, the stock prices. Nishat and Shaheen (2004) found industrial production having positive relationship stock prices in Pakistan.

Chakravarty (2005) has also examined positive relationship between industrial production and stock prices using Granger causality test and observed unidirectionality from industrial production to stock prices in India. Balance of trade has also been taken by many researchers to analyze its effects on stock exchange prices; however, it is observed that it has no significant effects on stock exchange prices, for instance Bhattacharya (2002) found negative relationship between trade balance and stock exchange prices in India.

Interest Rate

The simple dividend-discount valuation model may be used to explain the impact of economic factors on stock returns. Assuming constant growth in dividends, $P=D1/(k-g)$ (1) where P= stock price, D1= dividends after first period, g= constant growth rate of the dividends and k= required rate of return on the stock. Mukherjee and Naka (1995) hypothesized that changes in both short- and long-term government bond rates would affect the nominal risk-free rate and thus affect the discount rate. Fama and Schwert (1977) observed that the relationship applied to both the current period as well as for lagged values of the interest rates. Reily and Brown (2000), however, complicated the matter a bit by stating that cash flows from stocks can change along with interest rates and it is not certain whether this change in cash flows will augment or offset the change in interest rates. We hypothesize a negative relationship between interest rates and stock prices for the following reasons: (1) interest rates can influence the level of corporate profits which in turn influence the price that investors are willing to reinvest for the stock through expectations of higher future dividends payment. Most companies finance their capital equipments and inventories through borrowings. A reduction in interest rates reduces the costs of borrowing and thus serves as an incentive for expansion. This will have a positive effect on future expected returns for the firm; (2) as substantial amount of stocks are purchased with borrowed money, hence an increase in interest rates would make stock transactions more costly. Investors will require a higher rate of return before investing. This will reduce demand and lead to a price fall.

Inflation

The results of studies by Fama and Schwert (1977), Chen, Roll and Ross (1986), Nelson (1976) and Jaffe and Mandelker (1976) pointed to a negative relation between inflation and stock prices. We hypothesize similarly that an increase in the rate of inflation is likely to lead to economic tightening policies, which in turn increases the nominal risk-free rate and hence raises the discount rate in the valuation model (equation 1). The effect of a higher discount rate would not necessarily be neutralized by an increase in cash flows resulting from inflation, primarily because of cash flows do not generally grow at the same rate as inflation does. DeFina (1991) attributes this to nominal contract that disallow the immediate adjustment of the firm's revenues and costs. Cash flows would probably decrease initially if the cost of inputs adjusts faster to rising inflation than output prices.

Exchange Rates and Balance of Trade

We hypothesize a positive relation between the exchange rate and stock prices. A downgrading of the Singapore dollar will lead to an increase in demand for Singapore's exports and thereby increasing cash flows to the country, assuming that the demand for exports is sufficiently elastic. Alternatively, if the Singapore dollar is expected to appreciate, the market will attract investments. This rise in demand will push up the stock market level, suggesting that stock market returns will be positively correlated to the changes in the exchange rates (Mukherjee and Naka 1995). The impact of exchange rate changes on the economy will depend to a large extent on the level of international trade and the trade balance. Hence the impact will be determined by the relative dominance of import and export sectors of the economy.

Exchange Rates and Balance of Trade

Tainer (1993) viewed that the industrial production index is procyclical – that is, it rises during economic expansion and falls during a recession. It is typically used as a proxy for the level of real economic activity, that is, a rise in industrial production would signal economic growth. Fama (1990) and Geske and Roll, (1983) hypothesized a similar positive relationship through the effects of industrial production on expected future cash flows.

The productive capacity of an economy indeed depends on the accumulation of real assets directly, which in turn contributes to the ability of firms to generate cash flow. Chen, Roll and Ross' (1986) findings based on a US stock portfolio, indicated that future growth in industrial production was a vital factor in explaining stock returns. Hence, suggesting a positive relationship between real economic activities and stock prices. We hypothesize similarly that Fama (1981) had earlier found that the growth rate of industrial production had a strong contemporaneous relation with stock returns.

Money Supply

Friedman and Schwartz (1963) explained the relationship between money supply and stock returns by simply hypothesizing that the growth rate of money supply would affect the aggregate economy and hence the expected stock returns. An increase in M2 growth would indicate excess liquidity available for buying securities, resulting in higher security prices. Empirically, Hamburger and Kochin (1972) and Kraft and Kraft (1977) found a strong linkage between the two variables, while Cooper (1974) and Nozar and Taylor (1988) found no relation.

In the opinion of Mukherjee and Naka (1995), the effect of money supply on stock prices is an empirical question. An increase in money supply would lead to inflation, and may increase discount rate and reduce stock prices (Fama, 1981). The negative effects might be countered by the economic stimulus provided by money growth, also known as the corporate earnings effect, which may increase future cash flows and stock prices. Maysami and Koh (2000), who found a positive relationship between money supply changes and stock returns in Singapore.

Research Methodology

The study applied Unit Root Augmented Dickey Fuller (ADF) Test that proposed by Dickey and Fuller (1979, 1981), Johansen's (1988, 1991) Co-integration Test and Granger-Causality Test proposed by C.J Granger in (1969) if causal relationship exists between variables; Engle and Granger (1987) and Granger et al. (2000).

Similar types of test analysis have been used by Chen (1986) and Mukherjee and Naka (1995) in case of Singapore and India to measure stock exchange prices respectively.

Analysis of Variable

Earlier Litzenberger and Rama Swamy (1982) analyzed and examined causal relationship with macroeconomic variables and on stock prices. Similarly, this study attempted to observe the causal relationship between stock exchange price in Dhaka (DSE) and macroeconomic variables such as Consumer Price Index (CPI), Money Supply (M2), Index of Industrial Production (IIP), Exchange Rate (EXR) and Balance of Trade (BOT).

Data Analysis

The study used secondary data collected from monthly bulletins of Bangladesh Bureau of Statistics. For stock exchange prices, the monthly data of Dhaka Stock Exchange (DSE) general prices index was taken, DSE is dominating stock exchange within the other stock exchanges in Bangladesh. The data has been compiled from monthly various issues of bulletins of Bangladesh Bureau of Statistics. The data selected monthly data series of the six macroeconomic variables for the period of July 1990 to December 2012.

Tools and Techniques

The data was entered into MS Excel sheet, which exported to E-Views software for analysis purposes. The techniques used to determine the causal relationship between macroeconomic indicators and stock exchange prices. Augmented Dickey Fuller test, Johansen's Co-integration test and Granger causality test are presented and discussed in detail.

Procedures of Data

The objective behind collection of monthly data was to have in-depth analysis of these variables. Firstly, the descriptive statistics analyses were conducted through E-Views to know the mean, median, standard deviation, skewness, and kurtosis like statistics. Then unit root (ADF) test was applied to check the stationary status of the data, in order to have good analysis. After which Johansen's co-integration test was applied to check the cointegration between and among the variables. At the end the Granger causality test was applied to measure the causal relationship between macro-economic variables and stock exchange prices.

Results and Discussion

In this section, results derived from descriptive statistics, Augmented Dickey Fuller test, Johansen's Co-integration test and Granger causality test are presented and discussed in detail.

Table 1 provides self-explanatory descriptive statistics analysis done through E-Views statistical software. Money supply has the mean of 14.09142 million rupees with standard deviation of 0.723578. Exchange rate has the mean of 3.841879 and standard deviation of 0.610092 million rupees. Inflation is having a mean of 4.495600 and standard deviation of 0.400074 million rupees. Index of industrial production is having a mean and standard deviation of 5.408499 and 0.251684 million rupees respectively. Balance of trade is having a mean and standard of -21548.78 and 36207.26 respectively. Similarly, stock exchange prices are having mean of 5.471148 and standard deviation of 0.673284. The values of median, skewness, kurtosis, jarque-bera and probability are also given for all six variables in the Table 1.

Table 1. Descriptive Statistics.

Indicators	M2	EXR	CPI	IIP	BOT	DSEP
Mean	14.09142	3.841879	4.495600	5.408499	-21548.78	5.471148
Median	14.05302	3.947215	4.563550	5.367377	-7207.800	5.482512
Maxim	15.38244	11.26948	5.266052	6.118758	70488.50	10.96996
Minimum	12.73862	3.084201	3.734627	4.783316	-156698.4	4.548600
S. deviation	0.723578	0.610092	0.400074	0.251684	36207.26	0.673284
Probability	0.014810	0.000000	0.037389	0.305285	0.000000	0.000000
Observations	**220**	**220**	**220**	**220**	**220**	**220**

Source: completed by author.

Augmented Dickey Fuller Test

Augmented Dickey Fuller test has been applied to test the stationary status of the data using E-views software. Table 2 shows the Money supply (M2) is stationary at 1st difference, exchange rate (EXR) is stationary at 2nd difference with 2 lag value. Index of industrial production (IIP) was found stationary at level, consumer price index (CPI) at 1st difference, balance of trace (BOT) at 1st difference and DSE general price index (DSE) was found stationary at 1st difference.

Table 2. Results of Augmented Dickey Fuller (ADF) Test Statistic.

Microeconomic Indicators	STD.	Level of Significance		
		at 1%	at 5%	at 10%
Money Supply(M2)	-11.38097	-3.4620*	-2.8750	-2.5739
Exchange Rate EXR	-4.416295	-3.4619*	-2.8749	-2.5738
Industrial Product Price IIP	-4.165506	-3.4619	-2.8749	-2.5738
Consumer Price Index CPI	-5.718414	-3.4620	-2.8750	-2.5738
Balance of Trade BOT	-8.809642	-3.4620	-2.8750	-2.5739
Dhaka Stock Exchange DSE	-9.506999	-3.4620	-2.8750	-2.5739

Source: completed by author.

Granger Casualty Test

Results from Granger causality test are given in Table 3. The result shows no Granger causality between DSE prices and money supply in any direction, no Granger causality between DSE and index of industrial production, no Granger causality between DSE and exchange rate, no Granger causality between DSE and inflation, and no Granger causality between DSE and balance of trade. Overall, the study found no bi-directional Granger causality between macro-economic indicators and stock exchange prices in Bangladesh. Nishat and Shaheen (2004) found causal relationship between macro-economic variables and stock exchange prices in Pakistan. Where as this study found no causal relationship between macroeconomic indicators and stock exchange prices. One strong argument of this difference in findings is stock exchange performance during 2005-2008. During this period the stock market performance reached to its life high in all respects e.g. market capitalization, share prices, stock indexes. However, the macro-economic indicators do not show any significant improvement. Particularly, index of industrial production which did not showed such improvement when compared to stock exchange prices index.

Table 3. Results of Granger Causality Test

Particulars of Variables	Coefficient	Std. Error	t-Statistic	Probability
Money Supply (M2)	-3.520870	0.309365	-11.38097	0.0000
Exchange Rate (EXR)	-7.309024	1.655013	-4.416295	0.0000
Industrial Production (IP)	-0.150068	0.036026	-4.165506	0.0000
Consumer Price Index (CPI)	-0.805126	0.140795	-5.718414	0.0000
Balance of Trade (BOT)	-2.506769	0.284548	-8.809642	0.0000
Dhaka Stock Exchange (DSE)	-2.597937	0.273266	-9.506999	0.0000

Source: completed by author.

Conclusion

The study has analyzed the causal relationship between macro-economic indicators and stock exchange prices in Bangladesh. The macroeconomic indicators were represented by money supply, index of industrial production, exchange rate, inflation and balance of trade, whereas stock exchange prices were represented by general index of all share prices of Dhaka Stock Exchange. The study employed Granger causality test to analyze the causal relationship between macro-economic indicator and stock exchange prices in Bangladesh. The study found no causal relationship between macroeconomic indicators and stock exchange prices in Bangladesh. Individually, the study found no Granger causality between DSE prices and money supply in any direction, no Granger causality between DSE and index of industrial production, no Granger causality between DES and exchange rate, no Granger causality between DSE and inflation, and no Granger causality between DSE and balance of trade. Overall, the study found no bi-directional Granger causality between macro-economic indicators and stock exchange prices in Bangladesh.

The findings of this study are inconsistent with Nishat and Shaheen (2004), who found "causal" relationship between stock exchange and macro-economic variable in Pakistan. The discrepancy in findings of the study is due to blazing stock exchange performance during 2005- 2008, which was not supported by the macro-

economic performance of the economy of Bangladesh. The study shows that Bangladeshi equity markets are not having causal relationship with macro-economic indicators. Which employs that macro-economic (fundamental) news cannot be used to predict stock exchange prices in Bangladesh. Moreover, stock exchange performance also does not represent the macro-economic movement in the country.

Future Implication

Based on intuitive financial theory (Chen et al. 1986; Fama 1981) coupled with the results of previous studies, the findings of this study will enable us to investigate further in short and long-term relationships between prices of Dhaka Stock Exchange and country's Macroeconmic variables. However, considering country's positive economic growth, a few variables are to emerge such as Real Estate and Hotel and Leisure Sectors index.

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