

Economic Determinants and Price Index Behavior in Dhaka Stock Exchange: An Empirical Analysis

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Abstract. A number of economic determinants play an important role in influencing the behavior of price indexes of stock markets. This paper examines the responsiveness of General Price Index and DSE-20 Index of Dhaka Stock Exchange to the changes of some key economic factors, viz. dollar price, petrol price, bank rate, inter-bank call money rate, FDI and gold price. Studies in different stock exchanges show both positive and negative relationships between indexes or share prices and these variables. This study finds that both the DSE indexes are inversely related to the exchange rate, petrol price, bank rate and call money rate but has a positive relationship with gold price and FDI.

Key words: economic determinants, share market, Dhaka Stock Exchange, market capitalization, bullish trend, regression analysis.

JEL Classification: C22, C82, E22, E31, E52, E61, G21, G28

1. Introduction

Stock markets are called the barometer of an economy as the share price behavior reflects the fundamental macro economic condition of a country. That means, if the health of the economy passes through a good time, the share market should tend to show a bullish phase and vice versa. In efficiency term, stock markets deem efficient when they reflect the fundamental macro economic condition, implying that a financial market incorporates all relevant information, including macro economic fundamentals in the market, in which case the outcome is the best possible under the circumstances. In essence, a large number of economic variables like gross domestic product, interest rates, current account, money supply, employment, their information etc. have an impact on daily stock prices (Kurihara, 2006). Along with these, some other macroeconomic variables like the treasury bill rate (as a measure of interest rates), the consumer price index (as a

measure of inflation), and the exchange rate found to have significant influence on the share price index of some exchanges (Gunasekarage et al., 2004). Actually, the continuing increase in the world trade and capital movements has made exchange rate as one of the main determinants of business profitability and equity prices (Kim, 2003).

While Erbaykal and Okuyan (2007) found a unidirectional causality from stock price to exchange rates in the five economies, bidirectional causality exists for other three economies, and no causality for these financial variables in one economy. This contradicted the findings of Sevuktekin and Nargelecekenler (2007) which indicated positive and bidirectional causality between these two financial variables in Turkey. Muhammad and Rasheed (2002) examined the exchange rates and stock price relationships for Pakistan, India, Bangladesh and Sri Lanka and found a bi-directional long-run causality between these variables for Bangladesh and Sri Lanka. Ajayi and Mougoue (1996), Ajayi et al. (1998), Ibrahim and Aziz (2003) and many others examined the relationship between exchange rate and market indexes or prices in different exchanges in the world.

The effect of oil price becomes important in many of the markets where oil is the principal source of external income. Hammoudeh and Aleisa (2004) have studied the relationships among Gulf Cooperation Council (GCC) stock markets and NYMEX oil future prices with the conclusion that the index of the UAE stock market represents the country with the next highest link along with Bahrain after the Saudi Arabia market. But an empirical study undertaken by Ralph and Eriki (2001) on the Nigerian Stock Market examining the relation between stock prices and oil price found that oil price volatility has no significant effect on stock prices.

Few also wanted to explore the relationship of gold price and even foreign direct investment (FDI) with the stock prices in different exchanges. While Chakrabarty found no causal linkage between gold price and stock price in India (Chakrabarty, 2006), a study by Baker et al. (2004) came out with the empirical results that support the cheap capital view that FDI flows are unrelated to host country stock market valuations but are

strongly positively related to source country valuations and negatively related to future source country stock returns.

So price behavior of indexes is highly sensitive to many internal and external factors as they have direct and indirect bearings on companies' earnings and overall business conditions in an economy. Empirical studies also indicate that once the financial deregulation takes place, the stock market becomes more sensitive to both domestic and external factors (Chakravarty, 2006). Understandably, stock market indexes indicate the composite nature of influence of external factors more on the overall price behavior of shares in the market.

In Bangladesh, the financial market in general and stock market in particular are developing and their deepening, broadening and diversification are necessary to develop the overall capital market. Though a level of vibrancy has come in the functioning of the banks and non-bank financial institutions in the country, two operating stock exchanges, namely the Dhaka Stock Exchange (DSE) and the Chittagong Stock Exchange (CSE), have not yet shown significant improvement in their operations. The 1996 debacle in the DSE has created confusions among policy makers and a long lasting impact on the small investors¹. Moreover, most of the operators in the stock exchanges are involved in short-term speculative trading. This has encouraged many analysts to equate the stock markets in Bangladesh with casino gambling.

When the capital market itself is underdeveloped and stock exchanges are inefficient, then any effort to find the relationship between share price indexes and some of the macro economic variables may not be that easy. But considering the importance of different economic variables in influencing the investment decision in the share market, the present study has been devoted to examine the relationship between the price behavior of two indexes of DSE and variables like the exchange rate (price of dollar against Bangladeshi taka), petrol price, gold price, bank rate, foreign direct investment and inter-bank call money rate. Though there are number of models that could be used to find such a relationship, we have used the multiple regression analysis in our study.

¹ The debacle has been described more in the next section of the paper.

The importance of the variables taken indicates the justification of their selection. This could be extended a bit further. Actually, the influence of exchange rate on share price is seen most of the exchanges in the world. The strength and stability of the domestic currency of a country is measured by the level and volatility it has against the lead foreign currency, in Bangladesh's case it is the U.S. dollar. Any downward adjustment in the domestic currency makes investment in dollar an option and vice versa. This should in turn affect the stock prices inversely because of the moving away of the investors from the market. The oil price is another important variable that can affect the general inflation level in an economy. A rise in oil price has a cost push effect and vice versa. The investors are expected to get affected directly by the increase or decrease in oil price. So an inverse relationship is expected in price trend between them. In case of Bangladesh, the perceived effect of bank rate on stock prices should be more.² Generally, a central bank uses the bank rate as monetary policy measure to control the money supply in an economy. If the bank rate is high, then institutional investors and their borrowers may shy away from the stock market as the cost of investible fund becomes higher. Same is the case with inter-bank call money rate. The supply of money in the money market also helps to bring liquidity in the secondary market. The whole process is being influenced by bank rate and call money rate between banks. Additionally, gold price and inflows of FDI have been included in the model to examine whether they have any additional significant relation with share price movements in the DSE.

The remainder of the paper has been divided into five sections. Section two gives an overview of Dhaka Stock Exchange and its role in the capital market of Bangladesh. Section three is a review of literature that deals with the impact of different economic determinants on the share prices in different exchanges. This will give an idea on whether the pattern of impact on stock market prices in DSE is similar to or different from the findings of those studies. Section four explains the data coverage and methodology adopted in analyzing the type of relationship between changes of prices of the selected variables and share price in the DSE. Section five analyzes the findings of the study.

² Bank rate, also referred to as the discount rate, is a rate of interest which the central bank charges on the loans and advances that it extends to commercial banks and other financial intermediaries.

Section six makes few concluding remarks on the possible actions that could be taken so that DSE becomes more vibrant. Moreover, it draws the policy learning from the changes in selected macro variables that the potentials investors may take into consideration while making investment plans.

2. DSE in Bangladesh Capital Market: An Overview

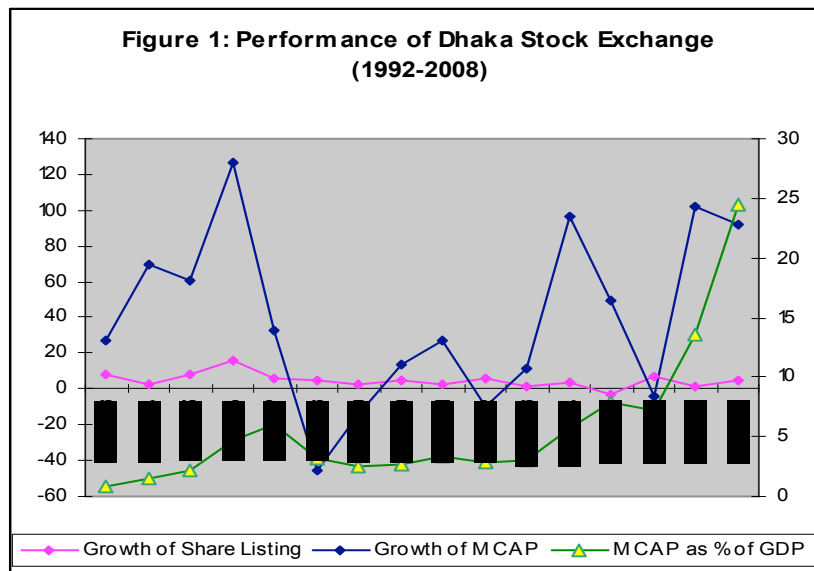
The capital markets of Bangladesh inherited its first legal backing from the Securities and Exchange Ordinance passed in 1969 during the Pakistani rule.³ More than two decades later, in 1993, the Securities and Exchange Commission (SEC) was established under the Securities and Exchange Act, 1993 to supervise and regulate the activities of the capital markets in Bangladesh. The SEC does it by performing constant real time monitoring and post-trading analysis of transactions in the DSE and CSE, two operational stock exchanges in Bangladesh.

Though DSE has a history of fifty years of functioning with a break of five years, CSE on the other hand has operational life of more than fourteen years since April, 1995. To deal with the issue a bit more, DSE started operation with its present name in May 1964, though it was first incorporated and operated as the East Pakistan Stock Exchange Association Limited in April, 1954 to June 1962 and then as the East Pakistan Stock Exchange Limited from June 1962 to May 1964. Trading activity of the Exchange remained suspended since the start of the war of liberation in 1971 until it restarted in 1976. The DSE is registered as a public limited company and its activities are regulated by its Articles of Association, its own rules, regulations and bylaws along with 1969 Securities and Exchange Ordinance, 1994 Companies Act, and 1993 Securities and Exchange Commission Act.

As has been indicated, the study focuses on DSE to give a view on the capital market of Bangladesh as well. Prior to the independence of Bangladesh in 1971, there were 196 securities listed on the DSE with a total paid-up capital of about Taka 4 billion and the daily average transaction of shares during that period was about 20,000 (Chowdhury,

³ When India was partitioned in 1947 by the British Empire, present Bangladesh was named as East Pakistan that joined Pakistan to form a single sovereign nation. But Bangladesh emerged to be an independent state in 1971.

1994). It has currently 195 members with provisions for up to 500 members. Its membership is open to foreigners as well. When restarted in 1976, DSE had only 9 listed companies with a paid-up capital of approximately Taka 137.52 million and at the end of that year total market capitalization (MCAP) of listed securities was about Taka 146.73 million.⁴ But over the years DSE has expanded and got into the present shape. The expansion has happened in terms of number of companies with listed shares, amount and growth of their market capitalization and the relative weight of MCAP to the economy of Bangladesh as a whole. The growth in share listing, MCAP and MCAP as a percentage of GDP has been depicted in the following figure.



Source: Bangladesh Bank, *Economic Trends*, various issues and authors' calculation.

A table has been constructed in the appendix to show the numeric developments in DSE in terms of the variables motioned right above. As we can see from Appendix Table1, during 1991-92 there were 138 companies listed with the DSE having a total market capitalization of Taka 10,048 million. Though the number of listed shares has gone up to

⁴ As we know, MCAP represents the aggregate value of a company or stock. It is obtained by multiplying the number of shares outstanding by their current price per share.

286 in 2007-08, the figure is not satisfactory if it is considered against the companies operating in the economy.⁵

The size of market capitalization is an important indicator of importance of the stock market in an economy. In terms of market capitalization of the companies, DSE has grown more than 78 folds between 1991 and 2008 when the capitalized amount reached to taka 788.8 billion. In percentage term the growth was highest in 1996-97 followed by 2006-07 when DSE recorded 126.97 percent and 102.23 percent growth respectively from the previous years. The bullishness in 1996-97 was a misplaced response of the investors in the share market activities as a result of an artificial bubble created by market manipulators. But market capitalization was not smooth always as DSE experienced negative growth in some of the years, notably in 1997-98 and 1998-99 when the amount shrunk by 45.31 percent and 14.11 percent respectively. This could directly be attributed to the 1996 debacle in the DSE when most of the foreign portfolio investors off loaded their shares and then got out of the market safely taking the advantage of the newly abolished locking provision.⁶ The bearish trend also affected DSE in 2001-02 and 2005-06 when market capitalization registered negative growth.

Analysis of market capitalization to GDP ratio indicates a fairly positive trend in the last few years. While this was barely 1.43 percent in 1993-94, it rose to 24.51 percent in 2007-08, which implies that this market has started contributing fairly to the country's corporate financing needs.

Initially DSE maintained only one composite index comprising all share prices. Presently, it has three types of indices, viz. DSE 20, DSE General Index or DGEN, and

⁵ In Bangladesh presently there are about 65,000 tax index number (TIN) holding companies as per the estimate of the National Board of Revenue. If we compare total number of listed companies in both the stock exchanges, 286 in the DSE and 244 in the CSE making a total of 530 ignoring the incidences of double listing, in Bangladesh against the corporate tax returnees, the number looks to be very dismal.

⁶ The genesis of the problem could be traced to four foreign institutional investors which arrived in Bangladesh in September 1996 following the withdrawal of the previously imposed lock-in system. Under this provision a foreign portfolio investor had to be in the market with the investment for a minimum of one year. When the provision was waived, they came in, bought lot of shares and sold them in the bubbled market and walked away with huge return at a short term. The local market players also played a big role in the market manipulation process.

All Share Price Index or DSI. The DSE-20 includes top 20 blue chips or the top 20 shares those are listed and traded in the Dhaka Stock Exchange. The benchmark index DGEN excludes Z-category companies or the junk category and is calculated on the basis of price movement of individual stocks. On the other hand, the DSI includes all securities and is calculated on the basis of price movement of individual stocks. In the appendix Table 2 we have presented the figures of the two measures for selected dates from January 2001 to June 2008 to indicate the changes that have taken place during the period.

Both the indexes of our consideration have shown a linear trend in increase of the values during the period. While the increase seems have gone at a steeper pace in the general index, rising from 652.90 to 2795.34 between January 2001 and December 2008, the increase was at a lower rate for the DSE-20 share price index, making an increase from 1327.73 to 2328.71 during the same period.

The salient feature of DSE is that it has remained mostly a trading market where speculative trading is more prominent than trading of shares for long term investment. So the real investor-base has remained still limited. The 1996 debacle in the market rendered many of the investors who came to the market for the first time losers. That experience and lack of understanding share market related technicalities did not help to broaden the real investors base in the DSE. The real investors are the small investors who invest in small portfolios to gain from cash and stock dividend and of course increase in share prices.

3. Impact of Economic Variables on Stock Price Indexes

Many empirical studies have been conducted to examine the relationship between stock prices and economic determinants in different stock markets covering different time periods and their findings are generally mixed. As has been indicated earlier, our study deals with the responsiveness of DGEN and DSE-20 Index to the changes in economic variables including prices of dollar, petrol, gold, bank rate, inter-bank call money rate and FDI. So the survey of literature has remained focused more on the findings on the studies

that have relevance to our kind of investigation. Though we have not included inflation in our study, there are some proxies like petrol price, bank rate and exchange rate that should have similar effect on the share prices. Bringing references on inflation is justified on the inclusion of the economic variables mentioned and their perceived impact on the economy and stock exchanges.

Kurihara (2006) chooses the period March 2001-September 2005 to investigate the relationship between macroeconomic variables and daily stock prices in Japan. He takes Japanese stock prices, U.S. stock prices, exchange rate (yen/U.S. dollar), Japanese interest rate etc. for the study. The empirical results show that domestic interest rate does not influence Japanese stock prices. However, the exchange rate and U.S. stock prices affect Japanese stock prices positively.

Ibrahim and Aziz (2003) applied cointegration and VAR modeling to evaluate the long term relationship and dynamic interactions between Malaysian Equity Market, various economic variables, and major equity markets in the United States and Japan using monthly data over the period 1977-1998. The macroeconomic variables used are real output, aggregate price level, money supply, and exchange rate. The study yielded two main findings: first, the Malaysian stock price index is positively related to money supply, consumer price index, and industrial production. Second, it is negatively linked to the movement of exchange rates.

In Indian context, Bhattacharya and Mukherjee (2002) studied the nature of the causal relationship between stock prices and macro aggregates in India by using the methodology proposed by Toda and Yamamoto for the period of 1992-93 to 2000-2001. Their results show that there is no causal relationship between stock price and macro economic variables like money supply, national income and interest rate but there exists a two way causation between stock price and rate of inflation. According to them index of industrial production lead the stock price. They further investigated the causal linkage between stock prices and macro economic aggregates in the foreign sector in India like exchange rate, foreign exchange reserves and value of trade balance by applying the technique of co integration and long run Granger non causality test developed by Toda

and Yamamoto (1995). Their results suggested that there is no causal linkage between stock price and the three variables. Thus BSE sensitive index neither leads these three variables nor do they lead the BSE sensitive index.

A paper by Chakravarty (2006) reexamined the relationship between stock price and some key macro economic variables in India for the period 1991-2005 using monthly time series data. The study uses Granger non causality test procedure developed by Toda and Yamamoto. The results of the study indicate that index of industrial production and inflation Granger cause stock price but stock price does not cause either of the two so the causation is unidirectional. The causal relation between stock price and money supply is unidirectional as stock price Granger cause money supply but money supply does not. On the other hand there is no causal relation between stock price and exchange rate. Similarly there is no causal linkage between gold price and stock price (Chakrabarty, 2006).

Gunasekarage, Pisedtasalasai and Power (2004) examined the influence of macroeconomic variables on stock market equity values in Sri Lanka, using the Colombo All Share price index to represent the stock market and the money supply, the treasury bill rate (as a measure of interest rates), the consumer price index (as a measure of inflation), and the exchange rate as macroeconomic variables. With monthly data for the 17-year period from January 1985 to December 2001 and employing the usual battery of tests, which included unit roots, cointegration, and VECM, they examined both long-run and short-run relationships between the stock market index and the economic variables. The VECM analysis provided support for the argument that the lagged values of macroeconomic variables such as the consumer price index, the money supply and the Treasury bill rate have a significant influence on the stock market.

Earlier studies like Fama (1981), Fama and Gibbons (1982), Summers(1986) and Chen (1991) verified that the efficient market hypothesis holds in US market, and there was significant linkage between US stock market on one hand and real economic variables, such as, GDP, industrial production, inflation and unemployment on the other. Zhao (1999) studied the relationships among inflation, output (industrial production) and stock

prices in the Chinese economy. The study employs monthly values covering the period from January 1993 to March 1998. The results indicate a significant and negative relation between stock prices and inflation. The findings also indicate that output growth negatively and significantly affect stock prices.

The relationship between stock price and exchange rate seemed to have attracted many of the researchers all over the world. The increasing level of financial integration might have influenced them to go for the investment. This could be understood by the amount of literature available on the issue.

A paper by Oguzhan and Demirhan (2009) investigates the causal relationship between stock prices and exchange rates, using data from 23 February 2001 to 11 January 2008. The results of empirical study indicate that there is bidirectional causal relationship between exchange rate and all stock market indices. While the negative causality exists from national 100, services, financials and industrials indices to exchange rate, there is a positive causal relationship from technology indices to exchange rate. On the other hand, negative causal relationship from exchange rate to all stock market indices is determined.

Pan et al. (2007) take the data of seven East Asian countries over the period 1988 to 1998 to examine dynamic linkages between exchange rates and stock prices. The result of study reveals that there is a bidirectional causal relation for Hong Kong before the 1997 Asian crises. Also, there is a unidirectional causal relation from exchange rates and stock prices for Japan, Malaysia, and Thailand and from stock prices to exchange rate for Korea and Singapore. During the Asian crises, there is only a causal relation from exchange rates to stock prices for all countries except Malaysia.

Ozair (2006) examines the causal relationship between stock prices and exchange rates in the USA using quarterly data from 1960 to 2004. The results show no causal linkage and no cointegration between these two financial variables. Kim (2003) uses monthly data for the 1974:01-1998:12 periods in the U.S.A. and the empirical results of the study reveal that S&P's common stock price is negatively related to the exchange rate.

Doong et al. (2005) investigate the dynamic relationship between stocks and exchange rates for six Asian countries (Indonesia, Malaysia, Philippines, South Korea, Thailand, and Taiwan) over the period 1989-2003. According to the study, these financial variables are not cointegrated. The result of Granger causality test shows that bidirectional causality can be detected in Indonesia, Korea, Malaysia, and Thailand. Also, there is a significantly negative relation between the stock returns and the contemporaneous change in the exchange rates for all countries except Thailand.

Mishra (2004) examined the relationship between stock market and foreign exchange markets using Granger causality test and Vector Auto Regression technique. He used monthly data for stock return exchange rate, interest rate and demand for money for the period 1992 to 2002. The study found that there exists a unidirectional causality between the exchange rate and interest rate and also between the exchange rate return and demand for money. The study also suggested that there is no Granger causality between the exchange rate return and stock return.

Tsoukalas (2003) examines the relationship between stock prices and macroeconomic factors in Cyprus. The result of study shows strong positive relationship between stock prices and exchange rates. The reason of this is that Cypriot economy depends on services (import sector) such as tourism, off shore banking etc.

Most of the empirical investigations that have examined the stock prices-exchange rate relationship have focused on examining this relationship for the developed countries with little attention to the developing countries. The results of these studies are, however, inconclusive. Some studies have found a significant positive relationship between stock prices and exchange rates. Muhammad and Rasheed (2002) examine the exchange rates and stock price relationships for Pakistan, India, Bangladesh and Sri Lanka using monthly data from 1994 to 2000. The empirical results show that there is a bi-directional long-run causality between these variables for only Bangladesh and Sri Lanka. No associations between exchange rates and stock prices are found for Pakistan and India. Smyth and Nandha (2003) investigate the relationship between exchange rates and stock prices for the same countries over the period 1995-2001. They find that there is

no long run relationship between variables. Also, the empirical results reveal unidirectional causality running from exchange rates to stock prices for only India and Sri Lanka. That is, changes in exchange rates affect stock prices through influencing firms' exports in India and Sri Lanka.

John Mauldin (2003) in a study on stock markets in 18 countries found strong evidence that changes in oil prices could be used to forecast stock returns. This predictability is especially strong in the developed countries markets. In 12 out of his chosen 18 countries, changes in oil prices significantly predict future market returns on a lagging monthly basis. Not surprisingly, a rise in oil price suggests a lower stock market and a drop in oil price infers a rise in stock prices. The magnitude of the oil price shift is also carried over into the magnitude of the expected increase/decrease in stock prices.

How does the inflow of FDI affect the share price? There are not many studies available that deals with the issue. A study by Baker et al. (2004) came out the empirical results that support the cheap capital view: FDI flows are unrelated to host country stock market valuations, as measured by the aggregate market-to-book-value ratio, but are strongly positively related to source country valuations and negatively related to future source country stock returns. The latter effects are most pronounced in the presence of capital account restrictions, suggesting that such restrictions limit cross-country arbitrage and thereby increase the potential for mispricing-driven FDI.

These studies raise enough questions and create enough space for an investigation in the impact of six macro economic variables on the stock prices in Bangladesh. In doing the analysis we have used data of the index prices on daily basis as our chosen variables seem to have day to day impact on the investment decision in the share market. Though there are a very few studies available for DSE, they simply deal with the impact of one or two macro variables on DSE share prices. That has given us the space to examine the influence of some other variables by using regression analysis.

4. Data and Methodology

Data:

The study has taken share price indexes of DGEN and DSE-20 for analyzing the impact of the selected economic variables on them. The analysis included price index data of DGEN and DSE-20 for all trading days between 2001 and 2008 or a total data for 2068 days, collected from the DSE. As has been pointed out earlier, DGEN Index comprises all share listed with the exchange except the z-category ones while DSE 20 Index includes top 20 shares in the market.

The literature review and experience survey have been done to identify the economic variables that should be taken into account. A number of stakeholders like share brokers, shareholders, bankers, and investors etc. were consulted to gather views on the possible impact of different economic variables on share prices. Though there are others factors which may be considered for this kind of analysis, the present study included exchange rate of taka against dollar (ExR), bank rate (BR), inter bank call money rate (CMR), gold price (GP), lag flow of foreign direct investment (LFDI) and petrol price (PET) to identify their effect on price indexes in the DSE.

The data for the variables of dollar price against taka, bank rate, inter bank call money rate, and flow of foreign direct investment have been collected from the sources of Bangladesh Bank. All these except the flow of FDI data are available daily basis but Bangladesh Bank also maintains a monthly average of them. Considering these as fair representation of any influence of the variables may have on the stock prices in the DSE, they have been converted to day to day basis to create the time series data for matched for running the regressions. The FDI data have a lag of four months in availability and publication. So the quarterly data have been used for the next quarter for running the model.

The daily data for gold and petrol price have been collected from the Bangladesh Jewelers' Association (BJA) and PetroBangla respectively.⁷

Our experience survey indicates that changes in dollar price, bank rate, inter bank call money rate and petrol price should have negative relationship with share price while FDI

⁷ The change in price of gold is not that frequent in the international market. The domestic price of gold is determined by the BJA which is a private body and the association members and non-member sellers follow the price. PetroBangla, on the other hand, is a government organ that buys oil from the international markets and sells it to the local distributors. It also fixes the domestic retail price of petrol.

should have a positive one. But impact of changes in gold price on share market remains uncertain as literature review suggested both positive and negative results. The share market practitioners are uncertain about the relationship between gold price and share price in DSE.

Methodology

We have done the regression analysis to justify the strength or weakness of relationship like as we have found that there is a significant relation between share price and other specific factors but we don't know how strong the relationship are. So by this analysis we have tried to figure it out. In other words, regression analysis has been used to establish whether our set of independent variables explains proportion of the variance in DSE price index at a significant level.

In statistics, regression analysis is used to model the relationship between random variables, one or more response variables or dependent variables, and the predictors also called input variables, independent variables or explanatory variables. We use the linear regression or equation for a straight line, constructed using the least-squares method (the line we choose is the one that minimizes the sum of the squares of the distances between the line and the data points). It's customary to use "a" or "alpha" for the intercept of the line, and "b" or "beta" for the slope. So linear regression gives us the following formula:

$$y = a + bx \quad (1)$$

where a is the intercept and b is the slope.

For Eq. (1), we can calculate b as:

$$b = \frac{\sum d_x d_y}{\sum d_x} \quad (2)$$

Then we can calculate the value of a from Equation (2):

$$a = -b\bar{x} \quad (3)$$

A linear regression equation is usually written as

$$y = a + bx + e \quad (4)$$

Where y is the dependent variable, a is the intercept, b is the slope or regression coefficient, x is the independent variable, e is the error term in Eq. (4)

The equation will specify the average magnitude of the expected change in y given a change in x . In this analysis we need to check out the value of statistical significance (sig. F change /p-value): The statistical significance of a result is the probability of the observed relationship between variables. One could say that the statistical significance of a result tells us something about the degree to which the result is "true". In our study the p-value of .05 would be treated as a "border-line acceptable" error level.

The coefficient of determination R^2 (R square) is also considered in this analysis. It is used to interpret the values of correlations. If the correlation coefficient is squared, then the resulting value R^2 will represent the proportion of common variation in the two variables.

Another way of measuring the contribution of x in predicting y is to consider how much the errors of prediction of y can be reduced by using the information provided by x . The sample coefficient of determination is developed from the relationship between two kinds of variation: the variation of the y values in a data set around: the fitted regression line and their own mean. The term variation in both cases is used in its usual statistical sense to mean "the sum of a group of squared deviations". The first variation is the variation of y values around the regression line, i.e., around their predicted values. This variation is the sum of squares for error (SSE) of the regression model -

$$SSE = \sum_{i=1}^n (y_i - \hat{y}_i)^2 \quad (5)$$

The second variation is the variation of y values around their own mean

$$SS_{yy} = \sum_{i=1}^n (y_i - \bar{y}_i)^2 \quad (6)$$

The coefficient of determination is

$$r^2 = \frac{SS_{yy} - SSE}{SS_{yy}} \quad (7)$$

It is easy to verify that

$$r^2 = \frac{SS_{yy} - SSE}{SS_{yy}} = 1 - \frac{SSE}{SS_{yy}} \quad (8)$$

where r is the coefficient of correlation in Eq. (8)

Therefore, usually we call R^2 the coefficient of determination.

F change is another variable which we need to know in order to measure the relationship's strength. The F-statistic is a ratio of two numbers, the mean square (or average variation) associated with the regression and the mean square associated with the residuals or errors. In other words, the F-statistic represents a ratio of explained variance to unexplained variance.

The F test is used to test the significance of R^2 , which is the same as testing the significance of R^2 , which is the same as testing the significance of the regression model as a whole. If probability (F) < .05, then the model is considered significantly better than would be expected by chance and we reject the null hypothesis of no linear relationship of y to the independents. F is a function of R^2 , the number of independents, and the number of cases. In SPSS, the F test appears in the ANOVA table, which is part of regression output. Here in our analysis, the value of F is calculated by this equation:

$$F = \text{M.S. (regression)} / \text{M.S. (Residual)} \quad (9)$$

In Eq. (9) M.S. stands for mean square and residual means error occurs in the analysis.

We have done multiple regression analysis also to check multiple variables effect on price index changes. Multiple regression is used to account for (predict) the variance in an interval dependent, based on linear combinations of interval, dichotomous, or dummy

independent variables. Multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level (through a significance test of R^2), and can establish the relative predictive importance of the independent variables (by comparing beta weights). Power terms can be added as independent variables to explore curvilinear effects. Cross-product terms can be added as independent variables to explore interaction effects. One can test the significance of difference of two R^2 s to determine if adding an independent variable to the model helps significantly.

In general, multiple regression procedures will estimate a linear equation of the form:

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_nx_n + e \quad (10)$$

In this Eq. (10), the regression coefficients (or b coefficients) represent the individual contribution of each independent variable to the prediction of the dependent variable. Another way to express this is to say that, for example, variable x_l is correlated with y , after controlling for all other independent variables. In all we have used ExR, PET, GP, BR, lag FDI and inter-bank CMR as independent variables. In the equation e is the provision for unexplained part of the result not covered by the economic variables of the model.

5. Empirical Results

To find the explain ability of the changes in prices of shares expressed by the price indexes of DSE we have used a multi-linear regression model. This will help us quantitatively explain the impact of different explanatory variables on changes in price index in the DSE.

Results of the analysis are show in following Table 1 and Table 2.

**Table 1: Regression Results for DGEN Price Index
(Jan. 2001 – Dec. 2008)**

Model	Unstandardized Coefficients		Standardized Coefficients	R ²	t	Sig.	F	Sig.
	B	Std. Error	Beta					
Constant	4369.311	187.809		.905	23.265	.000*	3263.181	.000*
BR	-226.773	13.370	-.207		-16.961	.000*		
ExR	-51.764	2.956	-.356		-17.513	.000*		
CMR	-6.921	1.652	-.032		-4.189	.000*		
GP	.169	.003	1.400		57.553	.000*		
PET	-16.182	.950	-.353		-17.031	.000*		
LFDI	.321	.020	.176		15.829	.000*		

Source: Calculated.

- Note: 1. Predictors: (Constant), CMR, GP, BR, FEx, FDI, and PET
 2. Dependent Variable: DGEN
 3. * Indicates values are significant at 1 percent level

Thus the Model stands with the values as follows:

$$(i) \quad DGEN = 4369.311 - 226.773 BR - 51.764 ExR - 6.921 CMR + 0.169 GP - 16.182 PET + 0.321 LFDI + e$$

The model has R² value of 0.905, meaning thereby that the independent variables can explain 90.5 percent of changes in general price index in the DSE. The variables inter-bank call money rate (CMR), bank rate (BR), price of dollar (ExR) and petrol (PET) have an inverse relationship as indicated by the negative values of their coefficients with the share price index of Dhaka Stock Exchange. This is in line with the findings of various studies Amare and Mohsin (2000) and Muhammad and Rasheed (2002) done in various Asian markets. Their findings suggested a conversational and bi-directional relationship of these variables with the share prices of those markets. For Bangladesh this relationship is understandable. An increase in BR and CMR reduces the flows of short-term cash in the market resulting less players in the share market. Some of the players who will otherwise be buying or selling shares may now look for alternative investment options. Similarly, a rise in price of PET is sure to affect inflation and hence purchasing power of the people in general and users of petrol in particular. This does not

corresponds with the study of Gjerde and Saetten (1999) that finds a positive relationship on oil price and stock return for oil exported countries. This is understandable taking into the consideration of the economies and their dependency on oil export. The present study find an inverse relationship between oil price and stock price index in Bangladesh. Possible explanation could be that due to rise in oil price, production cost also increases making inflation level higher. Which may ultimately lead to a fall in aggregate economy affecting the stock index reversely. Lining up with the same argument, Sebastein (2005) finds a good correlation that a frequent change in oil prices tends to recession and disturbance in the economy, highly affecting the stock market negatively. So a bi-directional relationship is obvious.

On the other hand, gold price and FDI (lag) have a uni-directional relationship with DSE general share price index. Gold price, oil price, exchange rate and interest rate (BR) are considered as a global variables, a global effect on these variables are often linked with country specific events and transmitted to other countries. So, depending on the trade intensity and financial integration on the country, a negative affect on oil price, exchange rate and interest rate would therefore be controlled by a positive relationship on gold price, similar concept supported by Chin and Forbes (2003). Their study shows, in an equilibrium model, an increase in international global variable, like, oil, interest rate and exchange rate will aversely control the variable gold price positively, fully supporting our result. Another plausible explanation of positive relationship between gold price and stock indexes could be that gold is considered an important saving instrument in Bangladesh and is very often used as a hedge against inflation, for holding purposes, as an alternative asset. However, the coefficient of gold is not that significant. This result supports the findings of Chakraborty (2006).

While measuring the significance of t values of the variables, we find that all the variables are highly significant having significance level at 1 percent. The F value of the model is 3263.181 and significance of F change is at 1 percent level.

Results of the DSE-20 price index analysis do indicate a very similar pattern of relationship between the variables and price index.

**Table 2: Regression Results for DSE-20 Price Index
(Jan. 2001 – Dec. 2008)**

Model	Unstandardized Coefficients		Standardized Coefficients	R ²	t	Sig.	F	Sig.
	B	Std. Error	Beta					
Constant	5645.992	186.512		.773	30.271	.000*	1170.139	.000*
BR	-100.301	13.278	-.142		-7.554	.000*		
ExR	-80.299	2.935	-.858		-27.355	.000*		
CMR	-8.271	1.641	-.060		-5.041	.000*		
GP	.127	.003	1.643		43.734	.000*		
PET	-8.909	.944	-.302		-9.443	.000*		
LFDI	.535	.020	.456		26.608	.000*		

Source: Calculated.

- Note:
1. Predictors: (Constant), Petrol, CMRB, FDI, BR, GP, FEx
 2. Dependent Variable: Index
 3. * indicates values are significant at 1 percent level

$$(ii) \quad DSE-20 = 5645.992 - 100.301BR - 80.299ExR - 8.271 CMR + 0.127 GP - 8.909PET + 0.605 LFDI + e$$

From Table 2 we find that the model has R² value of 0.773, meaning thereby that the independent variables can explain 77.3 percent of changes DSE-20 price index in the Dhaka Stock Exchange. The variables inter-bank call money rate (CMR), bank rate (BR), price of dollar (ExR) and petrol (PET) have a negative relationship with the DSE-20 share price index. The explanation we have offered above to explain the relationship between DGEN and the economic variables remains valid in this case too. The results further reinforces a reason for the negative relationship between exchange rate and DSE-20 Index. Most of the companies in the DSE-20 Index have a substantial level of exports. So a downward adjustment in the domestic currency should increase the competitiveness of the company in the international market. Consequently, the exports of the companies should go up enhancing their net income position. This is a plausible situation for the investors so they may be enticed to increase investment in stocks of those companies, signifying the bi-directional relationship between dollar price and stock index. In a short

term context a downward volatility of domestic currency can also increase flows of FDI in the economy which in its turn should increase the share prices in the stock exchanges.

Our findings for DSE-20 for LFDI are similar to that of the DGEN, implying not only the positive impact of FDI on stock price index but also a relationship chain with the exchange rate. Actually, both GP and LFDI have a uni-directional relationship with DSE-20 price index.

While measuring the significance of t values of the variables, we find that all the variables are highly significant having significance level at 1 percent. The F value of the model is 1170.139 and significance of F change is at 1 percent level.

6. Conclusion

The results of the study reinforces that many macro economic factors have relationships, both positive and negative, with stock market. Though the study is not exhaustive in the inclusion of all possible macro economical variables, it includes a set of variables that are important. Moreover, the influences of most of the determinants used in the study have so far remained unexamined in the context of Dhaka Stock Exchange. Hence the policy implications of the findings become important in making DSE a vibrant secondary market.

The finding that both the DSE indices are inversely related with the prices of dollar, petrol, bank rate and call money rate can make the investors cautious of timing of investment once the information is available to them. The results indicate that both bank rate and price of petrol could be used as policy tools to influence the stock markets of Bangladesh. Bank rate as a money market instrument can also be used to encourage or even discourage investment in stock exchanges. Reducing the bank rate could be one of the measures for boosting the share market as well. Petrol price, on the other hand, is a factor that has a multi-dimensional impact on the society. An increase in price of petrol not only lowers the standard of living, but also reduces the participation of investors in the stock market. Alluring more FDI in the economy can also boost the share market up as they have a positive relationship with FDI. Though in many of the markets gold price influences index of share price negatively, the

general price index and DSE-20 seem to behave differently than them by showing a positive correlation.

References

- Ajayi, R. A., and M. Mougoue (1996), "On the dynamic relation between stock prices and Exchange rates", *Journal of Financial Research*, Vol.19: 193–207.
- Ajayi, R. A., J. Friedman, and S. M. Mehdian (1998), "On the relationship between stock returns and exchange rates: Test of granger causality", *Global Finance Journal*, Vol. 9, No. 2: 241– 251.
- Amare, T., and M. Mohsin (2000) 'Stock Prices and Exchange Rates in leading Asian economies: Short Run versus Long Run dynamics.' *Singapore Economic Review*, Vol.45, No. 2: 165-181.
- Aydemir, Oguzhan and Erdal Demirhan (2009), "The Relationship between Stock Prices and Exchange Rates Evidence from Turkey", *International Research Journal of Finance and Economics*, Issue 23: 208-215.
- Baker Malcolm, C. Fritz Foley Jeffrey Wurgler (2004), "The Stock Market and Investment: Evidence from FDI Flows," NYU Working Paper No. Fin-04-013.
- Bangladesh Bank, *Economic Trends*, various issues.
- Bhattacharya, B and J. Mukherjee (2002), Causal relationship between stock market and exchange rate, foreign exchange reserves and value of trade balance :A case study for India," (viewed March, 2009), www.igidr.ac.in.
- Chakravarty, Sangeeta (2006), "Stock market and macro economic behavior in India", Discussion Paper 106, Institute of Economic Growth, Delhi.
- Chen, N.F. (1991), "Financial Investment Opportunities and the Macro Economy," *Journal of Finance*, Vol. 46: 529-554.
- Chin, M and K. Forbes (2004), "A decomposition of global linkages in financial markets over time." *Review of economics and Statistic*, Vol.80: 705-722.
- Chowdhury, A. R. (1994), "Statistical Properties of Daily Returns from the Dhaka Stock Exchange," *The Bangladesh Development Studies*, Vol. XXII: 61-76.
- Doong, Shuh-Chyi, Yang, Sheng-Yung and Wang, Alan T. (2005), "The Dynamic Relationship and Pricing of Stocks and Exchange Rates: Empirical Evidence from Asian Emerging Markets", *Journal of American Academy of Business, Cambridge*, Vol. 7, No.1: 118-123.

- Erbaykal, E. and Okuyan, H.A. (2007), "Hisse Senedi Fiyatları ile Döviz Kuru ilişkisi: Gelişmekte Olan Ülkeler Üzerine Ampirik Bir Uygulama", *BDDK Bankacılık ve Finansal Piyasalar Dergisi*, Vol. 1, No.1: 77-89.
- Famma, Eugene (1981) "Stock returns, real activity, inflation and money", *American Economic Review*, Vol.71: 545-564.
- Famma E.F and Gibbons M.R (1982), "Inflation, real returns and capital investments," *Journal of Monetary Economics*, Vol. 9: 297-323.
- Gunasekarage, Abeyratna, Anirut Pisedtasalasai and David Power (2004), "Macroeconomic Macroeconomic Influence on the Stock Market: Evidence from an Emerging Market in South Asia," *Journal of Emerging Market Finance*, Vol. 3, No. 3: 285-304.
- Gjerde, Oystein and Frode Sættem (1999), "Casual relations among stock returns and macroeconomic variable in a small, open economy," *Journal of International Financial Market, Institution and Money*, Vol. 9: 61-74.
- Hammoudeh, S., and Aleisa, E. (2004), "The dynamic linkage of the GCC Stock Markets," *Contemporary Economic Policy*, January, Vol. 22, No. 1: pp 50-62.
- Ibrahim, H and Aziz, H. (2003) "Macroeconomic variables and the Malaysian equity market: A view through rolling subsamples", *Journal of Economic Studies*, Vol. 30, No. 1: 6-27.
- Kim, K. (2003) "Dollar Exchange Rate and Stock Price: Evidence from Multivariate Cointegration and Error Correction Model", *Review of Financial Economics*, Vol.12: 301-313.
- Kurihara, Yutaka (2006), "The Relationship between Exchange Rate and Stock Prices during the Quantitative Easing Policy in Japan", *International Journal of Business*, Vol. 11, No.4: 375-386.
- Mauldin, John (2003), "The Connection between Oil and Stock Prices", *FLT*, Dec. 20.
- Mishra, Alok Kumar, 2004. "Stock Market and Foreign Exchange Market in India: Are they Related?", *South Asian Journal of Management*, Vol. 11, No. 2: 12-31.
- Muhammad, Naeem and Rasheed, Abdul, 2002. "Stock Prices and Exchange Rates: Are They Related? Evidence from South Asian Countries", *The Pakistan Development Review* Vol. 41, No. 4: 535-550.
- Pan, Ming-Shiun, Fok, Robert Chi-Wing and Liu, Y. Angela (2007) "Dynamic linkages between exchange rates and stock prices: Evidence from East Asian markets", *International Review of Economics and Finance*, Vol. 16: 503-520.
- Ozair, Amber, 2006. "Causality Between Stock prices and Exchange Rates: A Case of The United States", Florida Atlantic University, Master of Science Thesis.

- Ralph I. Udegbumam and P. O. Eriki (2001), “Inflation and Stock Price Behavior: Evidence from Nigerian Stock Market,” *Journal of Financial Management & Analysis*, Vol. XX, No. 14 (1): 1-10.
- Sevuktekin, Mustafa and Nargelecekenler, Mehmet (2007), “Türkiye’de IMKB ve Döviz Kuru Arasındaki Dinamik İlişkinin Belirlenmesi”, 8. Türkiye Ekonometri ve İstatistik Kongresi, İnönü Üniversitesi, Malatya.
- Smyth, R. and Nandha, M. (2003), “Bivariate causality between exchange rates and stock prices in South Asia”, *Applied Economics Letter*, Vol. 10: 699–704.
- Summers, L.H (1986), “Does the stock market rationally reflect fundamental variables?” *Journal of Finance*, 591-601.
- Toda, H.Y and Yamamoto, T. (1995), “Statistical inference in vector auto regressions with possibly integrated processes,” *Journal of Econometrics*, Vol. 66:225-50
- Tsoukalas, Dimitrios (2003), “Macroeconomic factors and stock prices in the emerging Cypriot equity market”, *Managerial Finance*, Vol. 29, No. 4: 87-92.
- Walti, Sebastin (2005), *The Macroeconomic Determinants of Stock Market Synchronisation*, Mimeo, Department of Economics, Trinity College Dublin (July).
- Zhao, Xing-Qiu (1999), “Stock prices, inflation and output: evidence from China,” *Applied Economics Letters*, Vol. 6, No. 8: 509-511.

Appendix A

Table 1: Performance of Dhaka Stock Exchange (1991-2008)

Year	No. of Company	Market Capitalization (Tk. Billion)	Mar. Cap. Growth	GDP (Tk. Billion) Base: 1995-96	Mar. Cap./GDP (%)
1991-92	138	10.048	--	1335.99	0.75
1992-93	149	12.816	27.55	1444.68	0.89
1993-94	153	21.700	69.32	1515.14	1.43
1994-95	166	34.965	61.13	1589.76	2.20
1995-96	192	79.362	126.97	1663.24	4.77
1996-97	203	105.763	33.27	1752.85	6.03
1997-98	213	57.843	-45.31	1844.48	3.14
1998-99	219	49.684	-14.11	1934.29	2.57
1999-00	229	56.258	13.23	2049.27	2.75
2000-01	234	71.365	26.85	2157.35	3.31
2001-02	248	64.668	-9.38	2252.61	2.87
2002-03	251	72.167	11.60	2371.01	3.04
2003-04	259	141.851	96.56	2519.68	5.63
2004-05	251	212.176	49.58	2669.74	7.95
2005-06	269	203.502	-4.09	2846.73	7.15

2006-07	273	411.547	102.23	3029.71	13.58
2007-08	286	788.822	91.67	3217.86	24.51

Source: Bangladesh Bank, *Economic Trends*, various issues and authors' calculation.

- Note: 1. Market capitalization and GDP figures are expressed in Taka, the currency of Bangladesh.
2. US \$1 = Approximately Taka 69.00 (in April 2009).

Table 2: General Index and DSE-20 Index

DD/MM/YY	General Index	DSE 20
01/01/2001	652.90	1327.73
02/07/2001	716.23	1251.37
01/01/2002	834.52	1072.11
02/07/2002	793.32	980.93
01/01/2003	845.85	1051.52
02/07/2003	830.14	1061.77
01/01/2004	967.15	1229.39
04/07/2004	1304.10	1609.31
01/01/2005	1999.71	2177.40
02/07/2005	1689.70	1843.72
01/01/2006	1669.80	1597.86
02/07/2006	1341.25	1315.60
03/01/2007	1583.08	1389.54
02/07/ 2007	2190.46	1897.56
01/01/ 2008	3008.91	2495.65
30/06/ 2008	3000.50	2545.17
31/12/2008	2795.34	2328.71

Source: DSE Office, 2008.