PH. D. THESIS

ON

STOCK MARKET VOLATILITY: STOCK PRICE MOVEMENT AND STOCK RETURN MOVEMENT OF AN EMERGING MARKET - A STUDY ON DHAKA STOCK EXCHANGE

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF DOCTOR IN PHILOSOPHY (PH.D.)

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RESEARCHER'S DECLARATION

It is hereby declared that the thesis titled **"Stock Market Volatility: Stock Price Movement and Stock Return Movement of an Emerging Market – A Study on Dhaka Stock Exchange"** contains no material which has been accepted for award of any other degree in any university and it contains no material previously published or written by anyone except where due reference is made in the text of the thesis.

23-12-06

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SUPERVISOR'S CERTIFICATION

I am pleased to certify that the thesis on **"Stock Market Volatility: Stock Price Movement and Stock Return Movement of an Emerging Market – A Study on Dhaka Stock Exchange"** has been prepared by ***Hawlader Mohammad Mosarof Hossain*** a Ph.D. student of the Department of Finance, University of Dhaka, Bangladesh through an extensive research that has used descriptive, analytical and empirical methods. As a new area of research, this study is expected to provide an addition to the knowledge in the field of Finance. I have gone through the draft of the thesis thoroughly and found it satisfactory. It can be submitted to the University of Dhaka for fulfillment of the requirement for the Degree of Doctor of Philosophy (Ph. D.).

I wish every success of the researcher.

24.12.06

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STOCK MARKET VOLATILITY: STOCK PRICE MOVEMENT AND STOCK RETORN MOVEMENT OF AN EMERGING MARKET – A STUDY ON DHAKA STOCK EXCHANGE

Abstract

Investors invest in securities for returns that depend partly on price. They generally consider the ex-post and ex-ante returns of the securities while making an investment decision. This is because the investment in financial assets is always associated with different types of risks. So, they try to have clear understanding about the price and return behavior in a world of uncertainty and asymmetric information. The measurement of realized (historical) returns is necessary for investors to assess how well they have done or how well investment managers have done on their behalf. It is also important to remember how risk and return go together when investing. Therefore, it is not sensible to concentrate on the issue of price and return until and unless the consideration of the issue of risk in investment decisions involves a trade off between these two.

Prediction of stock price and return volatility has been considered as one of the most discussed and central issues both in finance literature and empirical research. Financial economists are concerned with the factors behind the existence and nature of stock market volatility. Different theories have been developed to find out the price and return behavior of securities and empirical studies have been conducted on different financial environments with diverse results. Previous studies show that stock price and return are affected by numerous factors e.g., insider trading, ownership pattern, number of listed companies, number of total shares issued, number of investors, policy decisions taken and implemented, performance, dividend, systematic risk, level of information and capital structure. Empirical results show that price and return are also influenced by January effect, the size effect, book value-market value ratio, initial public offerings, unexpected world events, economic news (Roll 1988) growth rate, employment, real activity, amount of import, export and foreign exchange reserve, inflation rate, money supply, interest rate on advance and deposit and level of consumption have significant relationship with stock price and return (Fama, 1981 & Asprem, 1989).But research in this area covering the stock market of Bangladesh is very much limited. Hence, a study on Bangladeshi capital market is of crucial importance. In view of the above, a study on stock price and return movement of listed companies of Dhaka Stock Exchange (DSE) will be of great interest for helping the investors to estimate the future price and return movement that will determine their expected rate of return and the other concerned.

After independence the stock market of Bangladesh began its journey in 1976 at DSE with 9 companies. With the liberalization policy followed by the govt. the market has witnessed continuous development over the years. All the parameters performed more or less on the positive direction i.e., aggregate value of traded securities continued to rise from Tk.403.61mil.(1993) to Tk.64860 mil(2005) with rising market capitalization from Tk.18098.7 mil(1993) to Tk.234211.7 mil (2005). However, a big share market scam took place in October 1996, when manipulators from both home and abroad siphoned off over Tk.5000.00 crores from mainly smaller investors and banks (Haque, 2004 & Chowdhury2006). Apart from that the market is growing in size and moving up steadily. For last few years, there is more or less

stable position in trading volume and all share price index in the market. Moreover, the recent developments are the introduction of automated trading system and central depository system. The introduction of CDS has eliminated the labor-intensive nature of the previous settlements by ending the physical delivery and execution of transfer deeds. Newly introduced system also helps to reduce the risk of loss and duplication of papers.

This study attempts to test the significance of stock price and return volatility and forecasting of these. Time period covers in this study is 1993-2005 and number of companies includes is 126. Based on existing literature different explanatory variables have been included in the empirical model to identify the determinants of stock price and return volatility. The variables included are number of listed companies, volume of listed securities, number of initial public offerings, price, earning per share, dividend per share, net asset value per share, price-earnings multiple, growth rate, import, export, foreign exchange reserve, inflation rate, money supply, advance interest rate, deposit interest rate and consumption. Sources of data are price quotations, published records, computer database, diary, fact-book, monthly review and annual report of DSE, annual report of Securities and Exchange Commission, Bangladesh Bank and Bangladesh Economic Review.

Simple and multiple regression analyses have been applied in this study for identifying the determinants of stock price and return. For validating the model Durbin-Watson test of autocorrelation, correlation matrix for the test of multicollinearity, White Noise test for the test of heteroscedasticity i.e., autoregressive conditional heteroscedasticity (ARCH) and Variance ratio test for examining the significance of volatility and Anderson Darling Normality Test have been conducted. The level of volatility of stock price has been forecasted by applying historical mean, moving average, exponential moving average, autoregressive moving average and autoregressive integrated moving average model.

The salient features and contributions of this study are as follows:

1. This study observed that the stock price is highly affected by number of listed companies, volume of listed securities, number of initial public offerings, earning per share and dividend per share.

2. This study also documented that stock price are significantly influenced by growth rate, amount of import, amount of export, amount of foreign exchange reserve, rate of inflation, volume of money supply, interest rate on advances, rate of inflation, deposit interest rate and level of consumption.

3. It is confirmed in this study that stock return is changed by book value per share and price-earnings ratio.

4. This study also revealed that return is determined by level of money supply, deposit interest rate, growth rate and rate of inflation.

5. It is identified in this study that stock price and return of DSE are significantly volatile.

6. This study documented that exponential smoothing model is the best one for forecasting stock price of DSE.

Presently there are some problems existing in DSE and stock price is significantly volatile. Government and other regulatory bodies are taking different positive initiatives for developing the capital market and ensuring transparency about all information. So it can be said that there is potentiality of earning positive return by making investment in stocks. The findings of this study and positive attitudes of different corners about recommendations will benefit the investors to judge the return behavior of leading companies, more precisely the risk averse investors, as they usually prefer to invest in blue chips. Further studies can be conducted on price and return behavior of stocks listed in DSE as well as volatility forecasting by incorporating other explanatory variables and qualitative factors.

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Allah Hafez
Hawlader Mohammad Mosarof Hossain

CONTENTS

CHAPTER FOUR: THEORETICAL FRAMEWORK AND LITERATURE REVIEW

PART – B

CHAPTER SIX: EMPIRICAL EVIDENCE FROM DETERMINANTS OF STOCK PRICE AND RETURN FOR DHAKA STOCK EXCHANGE

CHAPTER SEVEN: EVIDENCE FROM VOLATILTY FORECASTING MODELS FOR DHAKA STOCK EXCHANGE

CHAPTER EIGHT: SUMMARY AND CONCLUSION

CHAPTER - ONE

OVERVIEW OF THE STUDY

1.1. Introduction

Investors invest in securities for returns that depend partly on price. They generally consider the ex-post and ex-ante returns of the securities while making an investment decision. This is because the investment in financial assets is always associated with different types of risks. So, they try to have clear understanding about the price and return behavior in a world of uncertainty and asymmetric information. The measurement of realized (historical) returns is necessary for investors to assess how well they have done or how well investment managers have done on their behalf. It is also important to remember how risk and return go together when investing. Therefore, it is not sensible to concentrate on the issue of price and return until and unless the consideration of the issue of risk in investment decisions involves a trade off between these two.

Prediction of stock price and return volatility has been considered as one of the most discussed and central issues both in finance literature and empirical research. Financial economists are concerned with the factors behind the existence and nature of stock market volatility. Different theories have been developed to find out the price and return behavior of securities and empirical studies have been conducted on different financial environments with diverse results. Previous studies show that stock price and return are affected by numerous factors e.g., insider trading, ownership pattern, number of listed companies, number of total shares issued, number of investors, policy decisions taken and implemented, performance, dividend, systematic risk, level of information and capital structure. Empirical results show that price and return are also influenced by January effect, the size effect, book value-market value ratio, initial public offerings, unexpected world events, economic news (Roll 1988) growth rate, employment, real activity, amount of import, export and foreign exchange reserve, inflation rate, money supply, interest rate on advance and deposit and level of consumption have significant relationship with stock price and return (Fama, 1981 & Asprem, 1989).But research in this area covering the stock market of Bangladesh is very much limited. Hence, a study on Bangladeshi capital market is of crucial importance. In view of the above, a study on stock price and return movement of listed companies of Dhaka Stock Exchange (DSE)

will be of great interest for helping the investors to estimate the future price and return movement that will determine their expected rate of return and the other concerned.

The major objective of this study is to acquire knowledge through an in-depth literature review. First of all, there is an overview on most of the theoretical and empirical evidence on the stock market volatility on the international financial markets to have a clear understanding about the volatility and heteroscedasticity in stock returns. However, there is a through and intensive analysis on the data sets and the methods used in the prior studies. In this study it has been trying to highlight on the models can be applied for forecasting volatility of stock price and return of Bangladesh's stock market specially Dhaka Stock Exchange.

1.2. Rationale of the study:

In all respect, it is important to determine the variables affecting stock prices in an inefficient market like Dhaka Stock Exchange, where no study has been undertaken. In Western economies, security markets occupy a place of considerable importance in raising the rate of savings and channeling these savings into productive ventures. Such markets have drawn the attention of policy makers and to a limited extent of academicians. The investment climate of the country is predictable by a mere review of the behavior of the stock market. But it is usual that,

"*the winds that play upon stock exchange markets are so as varying and inconsistent as those that blow upon the ocean,*" *(Armstrong , F. E.,1958, p.119).*

Fluctuations in security prices are a function of a variety of factors and determining precisely what these factors are and their relative importance constitute the main considerations of the study. Specially, in an economically developing country like Bangladesh, suffering from a vicious circle of poverty, insufficient savings and investment in productive assets, an informationally inefficient market can not be expected to act as a further break on development due to high transactions costs, a lack of faith in the fairness of quoted prices and doubts about the legal forms of redress arising from inadequacies in company law relating to information disclosure and share transactions.

Most of the published studies relating to the operation of stock markets concentrate on US data. There are also many studies on other developed and relatively efficient markets

like Japan, UK, Australia, Singapore, Taiwan market. But there is little published evidence on the emerging markets of less developed and developing countries. This should be an issue of some importance to both the less developed countries and foreign investors since, in the absence of reliable financial information concerning the performance and prospects of the companies they are investing in, foreign investors are essentially gambling with their investors' money. As mentioned by Maxwell,

"***Some Asian markets occasionally become the favorites of international investors, causing the favored equity market index to reach new*** **highs" p.** ***268.***

This appears to result in very high volatility of stock market indices which tends to further undermine confidence in the markets, particularly as much of this volatility arises from unidentified causes. For example, the DSE market index as on June 30, 1995 was 776.88 points which shifted to 959.05 points on June 30, 1996. Even more surprising, is that the market index stood as on November13, 1996 to 3448.88 points, the historical highest index of DSE. Again in 1998 it fell to 600 points and as on December 31, 2005 the index was 1677.35. In thinly traded and informationally inefficient markets such as the DSE, the effects in terms of prices are very much more pronounced.

The level of volatility of stock prices influence the cost of capital, the potential growth through external acquisition and the very survival of a company as a separate entity and apparently irrational volatility in prices destroys shareholders' confidence in the market and has a negative effect upon wealth creation. With the view to attain high stock prices in the market, the company would formulate policy to bring the controllable factors at the desired level. To achieve the above goal, management need to know the relative influence of different factors on stock prices, i.e., to be able to identify why prices fluctuate.

The thrust for this study also stems from the imperfection of the market in Bangladesh. The prediction of stock prices in an efficient market might be very different from the task facing by analysts and investors operating in an inefficient market and the applicability of the voluminous studies of US and other developed markets may be very limited. For example, due to the totally different market setting, the comparison between an efficient and an inefficient market in respect of the degree of risk-preference or the degree of dividend-payoff-preferences of investors in an underdeveloped country may not be the

same as those of investors in a developed market. It may also reduce the data snooping problem (***Lo and Mackinlay, 1990).*** Regarding the data snooping problem, it can be pointed out that,

"*---the problem can be addressed by employing data from markets that have not been studied extensively, or predicting by using time periods that are new to analysts*" *(Haugen and Baker, 1996).*

Because of the lack of prior research in this market, an empirical examination of the structure and functioning of the DSE is of some interest in its own right. It is also interesting to find out the variables that influence behavior and how far these are similar and/or different from what appears to be the case in more informationally efficient market. The applicability of the existing theories based upon developed markets and also the policy implications of this research will be of importance if this market is to be developed beyond its current "infant" stage. This can be termed as: Nurse the baby, protect the child, and free the adult.

"A conviction that stock-markets were the product of mass (irrational) psychology akin to gambling, and a shortage, among economists, of the mathematical and statistical skills necessary for effective research in this field" (Paul H. Cootner 1964 ,p-79).

Stock market research was very slow in developing markets. In USA, academic interest only really began after the debacle of the 1929 stock market crash. Even so, compared with the far more extensive research on commodity prices, 1930's research on stock prices was rare and mostly undertaken by a small group of American Economists (Embry School of Economics) interested in using mathematics and statistical analyses to economic phenomenon. Presently stock price and its determinants in the market are the basic measurement scale and output of the market and therefore a vitally important and interesting issue of research. Many hundreds of studies have now been published on one or another issue relating to stock prices, their behavior over time and their relationship to information releases relevant to assessing the size and riskiness of future corporate earnings and dividend payments.

Fundamental approaches for stock analysis suggest that there are two components that determine the value of any security. These are:

(i) the expected stream of benefits (either dividends or earnings) and

(ii) the risk attached to these benefits, expressed as a required rate of return (or its empirical counterpart the reciprocal of the price-earnings ratio).

Financial Economists have long striven to explain the relationship between dividends and stock prices. One main question has been: what is the relative importance of dividends and retained earnings in determining a stock price? Underlying this question is the proposition that both retained earnings and dividends convey a return to the stockholders. The dividend hypothesis that the investor buys the dividend when he acquires a share of stock seems intuitably plausible because the dividend is literally the payment stream that he/she expects to receive. In evaluating this hypothesis it must be recognized that the stockholder is interested in the entire sequence of dividend payments that he/she may expect and not merely the current dividend. We have represented this infinite sequence by two quantities- the current dividend and the measure of the expected growth in the dividend- in order to arrive at an operational model. However, there is no doubt that the most important and predictable cause of growth in a company's dividend is retained earnings.

The discussion on the dividend hypothesis that is considered as one of the most influential factor for determining stock price has been provided the economic rationale by using the following equation:

$$P_t = \alpha_t + \beta_1 D_t + \beta_2 (Y_t - D_t)$$

where P_t = price at time t; D_t = dividend at time t; Y_t = profit available for distribution and the β_1 can be interpreted as an estimate of the rate of profit the market requires on common stock without growth, and the retained earnings coefficient β_2 is the estimate of what the market is willing to pay for growth. Thus, the theoretical relationship between dividend and retained earnings on the one hand and the stock price movement on the other would indeed be positive. Along with these ultimate determinants, there are some other factors which determine the stock price which are also important to the shareholders, managers, investors as well as other participants to the capital market. There are many reasons why share prices change, even in the absence of announcements of any changes in dividends. News items that are believed to signal changes in risk, the prices of substitute shares, future cash flows etc will lead to a change in the market price of a share. These factors may be external macroeconomic influences or be internal, i.e.

firm-specific, news items such as the announcement of new contracts, new managerial appointments etc.

It is worth drawing attention at this point to the fact that it is very much known to all that the stock prices heavily influenced by the payment of dividends and some other factors. Previous studies suggest that stock prices increase for increasing dividends and on the other hand stock prices fall for reducing or cut dividends (Asquith and Mullins, 1983; Healey and Palepu, 1988; and Michaely et al. (1995). However, in practice, some companies declare stable dividends as well as some others declare fluctuating dividends closely related to their income and sometimes related to their policy and strategy for maintaining goodwill in the competitive market.

Several studies have been conducted on the developed markets in different issues of stock price and return behavior but a very few have been conducted on the emerging markets. The existing evidence is of limited relevance in identifying the price and return behavior in an emerging market. However, it is known from experience that the companies listed on the emerging markets are quite different from the developed financial markets in all respects. It is also known that the emerging markets enlisted companies are insider controlled closely held firms and as informed insiders, brokers and exchange employees play their role in the market as speculators, which causes information asymmetry and irrationality in the emerging markets. For these reasons, the behavior of the stock prices of Dhaka Stock Exchange as an emerging market is likely to be quite different from what typically is the case in respect of an efficient market, such as the NYSE. The behavior of companies listed in the Dhaka Stock Exchange is also different from the companies listed on efficient markets. The price and return behaviors of firms listed on these two markets are also assumed to be different.

1.3. Objectives of the Study

1.3.1. Broad Objectives

Broadly the objective of this study is to measure and test the significance of stock price and return volatility. Then the major objectives of this study are threefold: *firstly,* to identify the determinants of stock price; *secondly,* to examine the price and return

behavior; and *thirdly,* to forecast the security price and return volatility by applying different models in an emerging market.

1.3.2. Specific Objectives

The specific objectives of this study are as follows:

1. To test the efficincy of the market.
2. To examine the behavioral pattern and also to find out the factors, relating to both stock market characteristics and macroeconomic variables which are supposed to influence the stock prices and subsequently returns.
3. To identify the stock market characteristics and macroeconomic variables that affect stock price and return.
4. To analyze the impact of stock market characteristics and macroeconomic variables on stock price and return.
5. To test the significance of price and return volatility.
6. To find out the forecasting ability of different variables about price and return behavior of stocks listed in DSE.
7. To help the planners, executives and practitioners in understanding the problems of stock market development in Bangadesh and framing recommendations for its future development.

1.4. Scope of research

Research can be conducted in many areas of stock market such as price behavior, market efficiency, dividend pattern, dividend effect on price, announcement effect, IPO pricing etc. After that price and return movement of an emerging market has been chosen as research topic. Because the performance of a market as well as of listed companies is reflected through price and return fluctuations. The issue of price pattern is also important for several reasons. *Firstly,* researchers have found that a firm uses present price as a base for estimating future price, stability and growth prospects of the firm. *Secondly,* price trend plays an important role in a firm's capital structure and cost of capital. Yet another set of studies have established the relationship between firm price and investment decisions (Saxena, 1999). This study will attempt to identify the criteria that determine price trend in an emerging market or to identify the influential factors to determine price pattern in an emerging market. This study will investigate whether the

criteria to determine stock price in an emerging market supports the previous empirical studies or not. This study will contribute to forecast stock price and return that will help policy makers, investors and to other researchers.

1.5. Structure of the thesis

Contents of this thesis are divided into two major parts, within which one or more chapters are organized. In theoretical **part A:** Chapter one contains Overview of the study, Chapter two contains Capital market of Bangladesh: some observations, Chapter three includes Dhaka Stock Exchange: an overview, Chapter four concerns with theoretical framework and literature review that again includes three sections such as *section I* contains theories related to stock prices and market efficiency, *section II* contains review of literature related to stock prices, returns and determinants and *section III* includes review of theoretical and empirical research on stock market volatility. In this part Chapter five deals with research design and methodology. In empirical **part B:** Chapter six contains the empirical evidence on determinants of stock price and return, Chapter seven deals with evidence from volatility forecasting models for Dhaka Stock Exchange and finally Chapter eight contains findings, summary and conclusion.

1.6. Conclusion

This study may be considered as the benchmark for the empirical studies on stock price and return behavior and security price reaction to the announcement of dividends and some other important factors in the emerging markets. Moreover, this study will draw attention to the portfolio investors, security analysts, policy-making bodies and especially regulatory bodies of the emerging markets. This study will provide a clear guideline to the parties associated with the market and especially to the outside investors. The study also will provide a guideline for making future investment decision based on forecasted results by applying different tools and techniques through proper selection of securities. Finally it can be concluded that this study will benefit the investors to judge the return behavior, as they usually prefer to invest in blue chips.

CHAPTER -TWO

CAPITAL MARKET OF BANGLADESH: SOME OBSERVATIONS

2.1. Introduction

For flourishing a country the developed and organized capital market is immensely needed that will nourish the industrial growth. But in Bangladesh there has always been a problem of financing in industries. The problem became more urgent as Bangladesh became industrially conscious. The process of industrial growth requires the development of a capital market that will provide an adequate and properly distributed supply of finance to the entrepreneurs who are setting up new industries or expanding existing industries. Finance itself produces no output until real assets are acquired for industrialization with it or working capital is made available. The availability of money and credit permits entrepreneurs to gain control on the real resources which enable them to engage in industry by producing and distributing industrial products. The process of allocation and distribution of resources is facilitated by the existence of a stock market. It makes investible funds available to the most prospective profitable companies which compete for share and debenture issues.

In the absence of capital market economic development heavily depends on internally generated savings and capital. Thus the development of capital market is a prerequisite for making the ownership of financial assets more attractive to medium and small investors and thereby to broaden the ownership of industrial wealth. Public issues by the private companies are not large in Bangladesh. So, it is time to examine the role of capital market of Bangladesh for ensuring expected economic development. Throughout the world the stock exchanges are considered as the unparallel institution for mobilization of savings and capital of the society and also a very sensitive barometer of business activity. In Bangladesh, this institution is playing a vital economic role for achieving economic emancipation. It can supplement governmental efforts to mobilize private capital and help government policy to inspire private enterprises a success. For these reasons stock exchanges are to be considered as the fibre of the economic activity of the country

The capital market can be considered as lifeblood of the country's industrial and economic development. Because through this market fund is collected from different parties and large amount of capital is formed that is ultimately invested in different industrial sectors. After issuing financial instruments in the primary market these instruments are traded in a place that is termed as stock exchange. It is a formal security market that may be national, regional or international, where all buyers and sellers of securities can transact it. In the corporate world, stock exchange plays an important role as a financial intermediary between savers and users of money. Investors are interested to invest in stock markets all around the world in order to earn the economic benefits. Larger companies often need substantial amounts of capital to finance their operation that may be beyond their capacity to generate from internal sources within reasonable time period. The stock market can permit these corporations to raise the amount through the issue of securities (initial public offering). Thus, by issuing primary shares, the companies enable themselves to meet financial needs.

2.2. Overview of the capital market of Bangladesh

The stock market is simply a place in which securities are traded. It is a formal security market where all buyers and sellers of securities can transact it. Without formal stock exchange it is not possible for investors to exchange their financial instrument when required. If there is a formal and organized stock exchange available then general public will be interested to buy the shares issued by companies for raising needed fund. Only this exchange can provide liquidity of financial assets formally. From this perspective stock exchange is the most crucial part of overall economic development.

In consideration of above points, the necessity of establishing a Stock Exchange in the then East Pakistan was first decided by the Government early in 1952. It was learnt that the Calcutta Stock Exchange had prohibited the transactions in Pakistani shares and securities. The Provincial Industrial Advisory Council soon there after setting up an Organizing Committee for the formation of a Stock Exchange in East Pakistan. A decisive step was taken in the second meeting of the organizing committee held on the March 13, 1953 in the cabinet room, Eden building, under the chairmanship of Mr. A. Khaleeli, Honorable Secretary Government of East Bengal, Commerce, Labor and

Industries Department at which various aspects of the issues were discussed in detail on the then Central Government's proposal regarding the Karachi Stock Exchange opening a branch in Dhaka. The members presented in the meeting were not in favor to open an Independent Stock Exchange in East Pakistan. It was suggested that Dhaka Narayanganj Chamber of Commerce and Industry should approach its members for purchasing the membership cards at Rs.2000 each for the proposed stock exchange. The location of the exchange it was thought should be either in Dhaka, Narayanganj or Chittagong. An organizing committee was appointed consisting of leading Commercial and Industrial personalities of the province with Mr. Mehdi Ispahani as the convenor in order to organize the exchange.

The chamber informed its members and members of its affiliated associations about the proceedings of the above meeting, requesting them to intimate whether they were interested in joining the proposed stock exchange or not. This was followed by a meeting, at the chamber of about 100 persons interested in the formation of the exchange on July 07, 1953. The meeting invited 8 gentlemen to become promoters of the exchange with Mr. M. Mehdi Ispahani as the convener and authorized them to draw up the Memorandum and Articles of Association of the exchange and proceed to obtain registration under the Companies Act. 1913. The other 7 promoters of the exchange were Mr. J M Addision –Scott, Mr. Mhodammed Hanif, Mr. A. C. Jain, Mr. A. K. Khan and Mr. M Shabbir Ahmed and Mr. Sakhawat Hossin. It was also decided that membership fee was to be Rs.2000 and subscription rate at Rs.15 per Month. The exchange was to consist of not more than 150 members. A meeting of the promoters was held at the Chamber on September 09, 1953 where it was decided to appoint Dignam & Co as a solicitor to draw up the Memorandum and Articles of Association of the stock exchange based on the rules of stock exchange existing in other countries and taking into consideration of local conditions.

The 8 promoters incorporated the formation as the East Pakistan Stock Exchange Association Ltd. on April 28, 1954 as a public company. On June 26, 1962 the name was revised to East Pakistan Stock Exchange Ltd. Again on May 14, 1964 the name of East Pakistan Stock Exchange Limited was changed to "Dhaka Stock Exchange Ltd". At the

time of incorporation the authorized capital of the exchange was Rs.300000 divided into 150 shares of Rs.2000 each. Then in an extra ordinary general meeting it was decided to increase the authorized capital to Rs.500000 divided into 250 shares of Rs.2000 each.

Although incorporated in 1954, the formal trading was started in 1956 at Narnyanganj after obtaining the certificates of commencement of business. But in 1958 it was shifted to Dhaka and started functioning at the Narnyangonj Chamber Building in Motijheel C/A. in October 1957. The stock exchange purchased a land measuring 8.75 Kattah at 9F Motijheel C/A from the Government and shifted the stock exchange to its own location in 1959. The Dhaka stock exchange (DSE) is registered as a public limited company and its activities are regulated by its articles of association, rules, regulations and by-laws along with the Securities and Exchange Ordinance, 1969, Companies Act 1994 and Securities and Exchange Commission Act, 1993.

2.3. Present scenario of capital market of Bangladesh

Efficiency is the prime consideration of the economic growth process under an enterprise system. Bangladesh Government is now setting for liberalization and privatization. An efficient capital market is of paramount importance in this process. Capital market in Bangladesh is at its infant stage and the public issues of corporate units are limited. The stock market is a pivotal institution of the financial system of a country. The stock exchanges are recognized by the government and function within the purview of the Securities Exchange Ordinance and related by-laws and regulations.

The stock market in Bangladesh is consisting of two stock exchanges-Dhaka stock exchange (DSE) and Chittagong stock exchange (CSE). Among the worlds smallest share market, the privately owned Dhaka Stock Exchange lists 253 companies; the Chittagong Stock Exchange lists 198 Companies. On an average day, shares of only 180 Companies are traded in both these markets. There was large surge in the stock market in the summer and fall of 1996, but the market crashed late in the year and has yet to fully recover. For much of 2000 the market continued to remain at historic or near historic lows, but in 2001 has shown some improvements. As of July 28, 2002, total market capitalization of listed companies was $1.1 billion in DSE and $1 billion in the CSE.

Foreign portfolio investment was more than $200 million that has been virtually disappeared. Securities and Exchange Commission (SEC) was formed in 1993 to regulated the DSE and CSE and protect investors. On September 28, 1997 the SEC imposed new restrictions on the involvement of foreign investors in the Bangladesh capital market. The guide line stipulates that 10% of primary issues are reserved for none-resident Bangladeshis (NBR). The position of capital market is presented in the following table:

Table 2.1: Present scenario of capital market of Bangladesh

Items	DSE	CSE
Total number of listed securities	249	213
Total number of companies	253	198
Total number of mutual funds	13	13
Total number of debentures	5	2
Total number of treasury bonds	18	0
Total number of shares	1244142000	1170363837
Total shares in Tk.	55851000000	50517574590
Market capital in Tk.	234211700000	209468218632
Market capital in $	3 074401538	3126391323
General index.	1677.34	3192.2372

Source: The DSE and CSE Annual Reports 2005

2.4. Growth and development of capital market of Bangladesh:

Capital Market of Bangladesh was in a dormant stage during the decades of sixties, seventies and early part of eighties. During this period, few companies accessed in capital market and investors were not interested or familiar in corporate securities. The market registered an impressive growth particularly from late eighties to mid-nineties.

The origin of the stock market in Dhaka goes back to 1954 when a Stock was formed in Narayanganj. Later in 1958 the Stock Exchange was transferred to Dhaka. The Companies Act 1913 and the Capital issues (Continuance of control) Act 1954 were two pieces of legislation governing the stock market in the country. Later, the Securities and Exchange Ordinance was promulgated in 1969. This ordinance required the companies

to take permission from the Controller of Capital Issues (CCI) for issuing capital and making public offer of securities. It also required the companies to submit annual reports and to provide information as required. In addition, this ordinance required the stock exchange to take registration from the CCI.

The capital market of Bangladesh made significant progress until the independence of the country. However, the post liberation nationalization of industries and socialistic policies of the government left no choice but to suspend the operation of Dhaka Stock Exchange. The era of opening up the economy began in 1976 and the operation of the Exchange resumed in that year. The Securities and Exchange Rules 1987 defined more than one decade after the resumption the stock market, disclosure requirements by the company. Although the CCI was responsible for monitoring the securities market, in practice it failed to do so partially because of lack of necessary powers. In spite of the existence of legislation, many companies did not behave properly to serve the interest of the investors. Delayed holding of annual general meeting, delayed payment of dividend and refund warrants, lack of timely reporting and non-compliance with disclosure requirements were common experiences. This era ended with the adoption of the Securities and Exchange Commission Act in 1993. By this major piece of legislation, the Securities and Exchange Commission (SEC) came in existence to monitor the securities market and to protect the interest of the investors. At the same time, the Securities and Exchange Commission (Amendment) Act 1993 repealed the Capital Issues Act. The formation of Securities and Exchange Commission brought the listed companies under the supervision of SEC. With its power to make regulations, the SEC promulgated two pieces of regulations, namely, the Securities and Exchange (Brokers, Dealers, and Sub-Brokers) Regulation 1994 and the Securities and Exchange (Insider Trading) Regulation 1994. Two other regulations for merchant bankers and portfolio managers and for mutual funds are in progress. Another major development in the legislation was the enactment of the Companies Act 1994 (see www. secbd.org).

The Dhaka Stock Exchange in the independent Bangladesh began its journey in 1976 with only 9 companies and it stands at 249 in 2005. The nationalization of the major local companies after independence left little scope for the development of the stock market at that time. The country's second stock market was formed in the second biggest

city of Bangladesh in Chittagong in 1995. That was really the growing demand for the people of Bangladesh and incorporation of the Chittagong Stock Exchange (CSE) was the right decision of the government to fulfill the excess demand of the people. The CSE is conducted by Computerized Automated Trading System like the DSE and the CSE is also a self-regulated private sector company which must have their operating rules approved by Securities and Exchange Commission (SEC). The Chittagong Stock Exchange started its operation with 72 listed companies in 1995 and stands at 198 in 2005 (CSE Annual Reports 1995-2005). The trading characteristics of Bangladesh's capital market are shown in the following table:

Table- 2.2: Trading characteristics of the capital market in Bangladesh

Trading characteristics	Dhaka stock exchange	Chittagong stock exchange
Date of incorporation	April 28,1954	April 01,1995
Previous names	East Pakistan stock exchange limited	-
Commencement of trading	1956	October 10,1995
Trading suspended	1971 during and after liberation war	-
Trading resumed	1976 with 9 listed companies	-
Number of members	195	124
Active securities	Average 150	Average 50
% of brokerage	0.30%--1%	0.30%--1%
Operation time	10:0 AM to 2:30 PM	10:0 AM to 2:30 PM
Trading method	Automated order matching system	Automated order matching system
Types of securities traded	Shares, debenture, and mutual funds	Shares, debenture, and mutual funds
Market capitalization as % of GDP	6.03% (approximately)	-

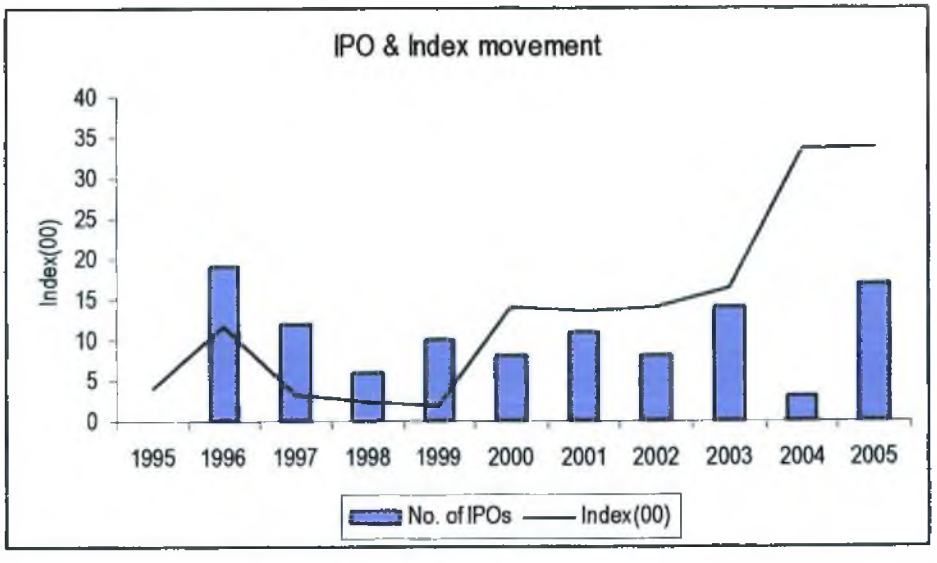
Total listed issues in the Dhaka Stock Exchange are 285, of which 249 are shares, 5 debentures, 18 treasury and other bonds and 13 mutual funds. The number of the listed companies in the Chittagong Stock Exchange is 210 with 9 Mutual funds and 4 debentures. Investment Corporation of Bangladesh (ICE) is the public sector player in the capital market. Both the Stock Exchanges have gone for automation in 1998. Currently, merchant banks and research institutions are operating in stock markets for issuing securities. (The DSE and CSE Annual Reports 1995-2005)

The growth and development pattern of Bangladesh's capital market is shown in the following tables:

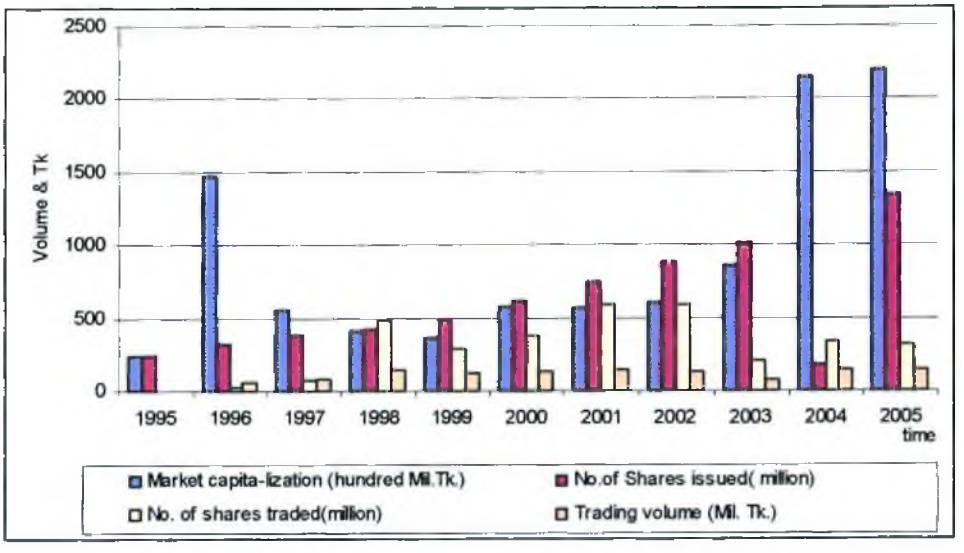
Table 2.3: Growth pattern of some variables of DSE

Year	No. Listed companies	No. of listed securities (Mil)	Issued capital (Mil. Tk.)	Market capitalization (Mil. Tk.)
1993	132	195.06	8201.50	18098.7
1994	150	241.5	11673.80	41770.7
1995	175	341.78	19438.05	56518.14
1996	191	397.43	23052.40	168106.0
1997	209	510.48	26813.43	71255.54
1998	228	504.16	27229.89	50254.02
1999	232	560.55	28159.80	45483.38
2000	241	640.28	29916.00	62924.00
2001	249	850.64	32215.00	63769.00
2002	260	1026.72	34364.00	71261.75
2003	267	1151.58	45370.00	98587.00
2004	273	1188.53	48996.00	224923.00
2005	285	1384.73	55851.00	234211.73

(Sources: the Annual Reports of the DSE (1993-2005)



Information presented in the above table reflect that number of listed companies, number of listed securities, amount of issued capital are increasing year to year over the sample period of 1993-2005, where as fluctuating trend in the amount of market capitalization.



The above graph shows that there is an irregular trend both in market capitalization and number of shares traded of DSE. There is an increasing trend in number of shares issued and trading volume in terms of amount (million taka).

Table 2.4: Growth and development of the capital market in Bangladesh (CSE)

Year	No.of Listed securities	Market capita-lization (Mil.Tk.)	No.of Shares issued	No. of shares traded	Trading volume (Mil. Tk.)	No. of IPOs	Index
1995	61	24139	245632120	124261	19.67	--	409.43
1996	117	147043	326523210	19440787	6078.47	19	1157.90
1997	140	55832	389774275	71804815	8544.26	12	332.98
1998	150	41382	423802762	482324355	14036.17	6	232.80
1999	159	36542	479013092	292382487	11538.59	10	196.40
2000	165	57760	611564970	370718033	12933.81	8	1412.25
2001	177	56364	746519389	593754410	14948.68	11	1352.39
2002	186	60468	876477809	586846683	13586.14	8	1415.92
2003	196	85440	1013175802	203731008	6719.30	14	1642.79
2004	198	215011	184974117	332534611	14807.76	3	3345.29
2005	210	220353	1339263193	310319542	14041.99	17	3378.68

(Sources: the Annual Reports of the CSE (1995-2005)

2.5. Regulatory framework

Certain rules and regulations as elsewhere govern the securities market in Bangladesh. Regulatory authorities of the capital market in Bangladesh consists of Securities and Exchange Commission (SEC formerly CCI), Registrar of Joint Stock Companies (RJSC), DSE, and CSE. Securities and Exchange Commission is under the Ministry of Finance and the RJSC is under the Ministry of Commerce. On the other hand, DSE and CSE are the corporate bodies under the Companies Act 1913. The RJSC partially implements the Companies Act 1913.

The Controller of Capital Issues (CCI) operated under the Capital Issues (Continuous of Control) Act 1947. Under this Act the Government gives consent, based on certain documents, to the issue of any security. The Securities and Exchange Ordinance of 1969 and Securities and Exchange Rules 1987 (SER 1987) are also implemented by the SEC to regulate the securities market and the dealings in securities. These provide protection to investors and regulate the securities market as a whole. The Ordinance establishes listing procedures regulates insider trading, prohibits fraudulent act, false statement etc. However, no definite mechanism as regards monitoring and implementing the above provisions was spelt out. Even the provision in the Securities and Exchange Rules 1971 to constitute a Securities and Exchange Authority of Bangladesh was omitted in SER 1987. In the absence of any definite authority for implementing the rules and regulation, securities market practically became nobody's business causing, inter-alia, improper trading, insider trading, fictitious trading, sleeping brokers, creative reporting and delayed reporting. However, recently SEC 1993 have been framed to supervise the securities market of Bangladesh. The companies Act 1913, which did not see any material change since 1936, appears to be weak in protecting the investors' interests. The time limit for allotment of shares and debentures after the issuance of prospectus, for issuance of share or debenture certificates, for registration of transfer of shares and debentures, for presentations of accounts and for holding of annual general meeting (AGM) after the last AGM within 180 days, 3 months, 9 months and 15 months respectively is too long compare to those of other countries like India, Pakistan, Sri Lanka, US and UK. Besides these, the Act is silent about the time limit for refund of excess application money and for payment of dividend.

Experts' reports on capital market in Bangladesh (Ahmed, Khan, and Islam, 1993) had recommended alterations, modifications and changes of these regulations. In Bangladesh, the regulatory framework is rather weak. The more striking is that the existing regulations are not implemented properly. The office of the RJSC, which implements the companies Act 1913, is incapable of enforcing the law because the professionals do not staff it. Consequently the law is simply ignored by companies. Allegations are found about non-holding of general meetings, regularly non-payment of dividend in time, irregular publication of financial statements, delay in disbursement of excess application money and so on. These are all against the interest of investors and thereby undermine investor confidence in the securities market.

The DSE and CSE, which are self-regulating, have their own listing rules. As we know that self-regulatory stock exchange generally creates the possibility of broker-favored bias, abuse of the system and exploitation of loopholes between various laws (Agtmael, 1984). Corporate listing with the DSE and CSE, in many cases, is influenced by the requirement of the regulatory authorities or the financial institutions, which impose listing requirement as a condition for getting credit attaching lesser importance to the other benefits of stock listing. However, there is some weakness in its regulatory framework regarding methods of trading, protection of customers and conduct of members. The stock exchanges have their own listing rules. But they are generally outdated and lack of objectivity and detailed provisions for listing and administration of listed stocks. The DSE and the CSE do not ensure disclosure of information on listed companies in order to protect the interest of investors. It does not enforce disciplinary regulations so that the violation of rules and regulations is minimized.

The Securities and Exchange Commission (SEC) is a government body under the Ministry of Finance. It is the successor of the office of the Controller of Capital Issues (CCI). The Controller of Capital Issues had the responsibility of controlling the stock market. Prior to the establishment of SEC, indiscipline in the stock market was prevalent. Many companies failed to hold AGM within time requirements, pay dividends on time, delivery the refund warrants on schedule and meet the disclosure requirements as prescribed by the law. The CCI could not curb the indiscipline in the market fully because it did not have necessary power to do so. In this backdrop, the formation of a

body to regulate the stock market with appropriate power and authority became an utmost necessity. The establishment of the Securities and Exchange Commission in 1993 was a significant step to this end.

The laws and regulations pertaining to the supply of securities in the market are the Securities and Exchange Commission Act 1993, the Securities and Exchange Commission (Amendment) Act 1993, the Companies Act 1994, the Securities and Exchange Ordinance 1969, the Securities and Exchange Rules 1987, the Securities and Exchange (Brokers, Dealers and Sub-Brokers) Regulations 1994, the Securities and Exchange (Insider Trading) Regulations 1994 and the Dhaka Stock Exchange and Chittagong Stock Exchange Listing Rules and bye-Laws.

Although there are the specific regulations of the SEC regarding the brokers, dealers and insider trading, the insiders, exchange employees and brokers are engaged with the speculations of the markets whereas the SEC is simply not capable to control all of these affairs perfectly that is why government was bound to take action against the speculators, which causes a big mess in the market in 1996-97 (Emerging Stock Market Fact-book 1998). However, as we know that the exchanges are self-regulated which is the basic obstacle of the controlling system of the capital market of Bangladesh. Even though the SEC introduced different laws but failed to implement perfectly in the market because both the exchanges and SEC failed to work together in many occasions.

2.6. Emerging markets vs. Bangladesh's markets

Emerging equity markets have long been characterized as having higher risk but also higher return than developed equity markets. Since 1991, most investors in these markets have focused primarily on the high returns available; 1994 is remembered for refocusing investor attention on the risks. That was a year in which many emerging markets experienced dramatic price swings and most markets ended the year at lower levels. Nonetheless, 1994 was also a year of substantial progress in emerging markets, with important advances made in their transaction efficiency, effectiveness as capital rising mechanisms and in the introduction of sophisticated investment techniques. Despite the roller-coaster performance of emerging markets occasioned by sharp sell-off and

frequent bad news, the broad IFC Global (IFCG) Composite Index, representing returns for 1266 stocks from 24 emerging markets, fell just over 2% in dollar terms in 1994. The IFC Investable (IFCI) Composite Index, which measured the returns from 890 emerging market stocks eligible for foreign portfolio investment and therefore reflecting foreign investors' reactions more directly fell substantially more, losing 13.8% for the year. All of the IFC's regional indexes also suffered declines in 1994, though there were specific periods in each region when losses tended to accumulate. The bottom fell out of virtually all-emerging markets for investors with Mexico's severe peso devaluation on December 20, 1994 (Emerging Stock Market Fact-book 1995). Nonetheless, many emerging markets experienced quite strong returns in 1994 and were the best performing markets at the global level. At year-end, out of the 20 best performing equity markets in the world, 19 were emerging markets. It is interesting to note that the leaders among these top markets were typically smaller, "pre-emerging" markets most of which are not currently included in any of the leading indexes. Kenya, for example, topped the list with a 179% increase over the year, followed by Egypt, Bangladesh, and Tunisia, which each increased well over 100%. Among the major emerging markets, Brazil was up by 65% in the dollar terms as measured by its IFCI index, followed by Peru (up 47%) and Chile (up 42%) (Emerging Stock Market Fact-book 1995).

Table- 2.5: Comparative position of all share price index of emerging markets ($)

Year	* DSE	Asia	Eastern Europe	Europe & Middle East	Europe	Far East	Latin America	Ex Asia
1993	391.77	416.59		131.19	143.12	416.59	907.40	621.58
1994	845.65	352.53	85.75	100.12	107.74	353.88	898.56	603.99
1995	834.73	328.43	67.05	111.74	110.08	352.18	763.02	539.95
1996	2300.15	333.63	95.46	124.40	133.66	360.55	907.50	574.05
1997	756.78	170.14	99.73	177.42	197.30	155.40	1164.66	706.78
1998	540.22	149.11	42.36	128.86	135.81	144.01	721.58	466.09
1999	487.77	249.97	70.87	227.65	246.20	236.14	1121.89	753.78
2000	642.68	143.62	56.54	174.42	159.26	127.89	915.63	599.67
2001	829.61	149.70	62.18	143.63	142.56	139.97	876.16	520.79
2002	848.41	140.35	71.23	130.60	146.66	129.98	658.94	470.52
2003	967.88	206.40	111.63	212.44	242.72	187.89	1100.85	740.95
2004	1971.31	231.63	147.46	273.70	323.70	210.00	1483.58	1003.03
2005	1677.35	286.17	215.43	387.92	476.35	256.37	2149.97	1395.20

Source: Morgan Stanley Capital International Inc & DSE annual report.

*** N.B. Index data of DSE (BD) is considered in terms of Tk.**

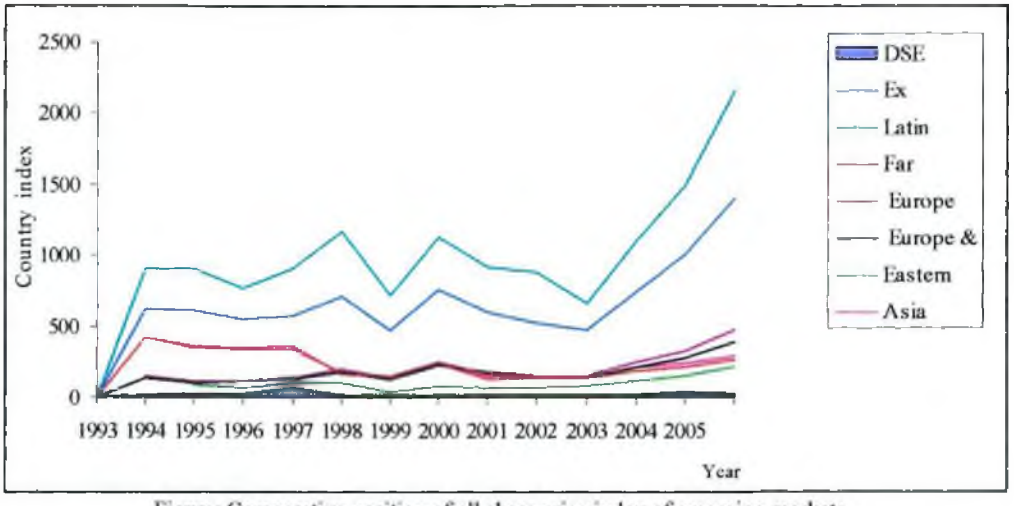


Figure: Comparative position of all share price index of emerging markets

However, in a pattern now familiar to emerging market investors, emerging markets also constituted eight of the ten worst performing markets in 1994. Indeed, some of the markets that were among the top performers in 1993 were some of the world's worst performers in 1994. In dollar term, Turkey was down by 43%, Poland by 43% and Argentina and Mexico by 42% on their IFC indexes (Emerging Stock Market Fact book 1995). Emerging stock markets had a difficult year in 1995. The IFC Invest able Composite Index (IFCI Composite), which tracks share prices for 1200 stocks in 26 emerging markets that are open to foreign investors around the world, registered an overall decline of 10.3%, while the broader IFC Global Composite Index, with over 1600 stocks from 27 markets, lost 13.9% (Emerging Stock Market Fact-book 1996).

For the year, IFCI Latin America Index and IFCI Asia Index dropped 19% and 7% respectively, while the IFCI Europe/Middle East/Africa (EMEA) Index soared 20%, thanks largely to solid gains in the heavily weighted IFCI South Africa Index (Emerging Stock Market Fact book 1996). The top performers of the emerging markets in 1995 are South Africa (14.9%), Zimbabwe and Jordan respectively (10.6%), Indonesia (9.9%), Peru (9.3%), and Argentina (8.7%). And the top five losers of the emerging markets in 1995 are Sri Lanka (39.6%), India (35.2%), Pakistan (32.6%), Venezuela (31.7%) and Taiwan (31.5%). However, Bangladesh lost only 1.3% in 1995 (Emerging Stock Market Fact- book 1996).

Emerging stock markets posted their first positive collective return since the boom of 1993, as measured by the IFC Global (IFCG) and Invest able (IFCI) Composite indexes. The IFCG Composite Index rose about 5.8% during 1996. It is the broadest indicator of emerging stock market performance available, covering 1779 stocks in 27 markets during 1996. The IFCI Composite Index, with 1224 stocks in 26 markets, is the broadest index available, designed to measure returns on emerging market stocks that are legally and practically open to foreign portfolio investment, and is a widely- used benchmark for international portfolio management purposes. The IFCI Composite gained 6.75% in 1996 (Emerging Stock Market Fact book 1997). On a regional basis, the largest gain came in Latin America. The IFCI Latin America Index was up 14% in 1996, followed by an 8.9% gain in the IFCI Asia Index, and a loss of about 5.2% in the IFCI Europe/Middle East Index (Emerging Stock Market Fact-book 1997).

While share price performance in most emerging markets was positive, individual performance among the emerging markets in 1996 was as diverse as the features of the markets themselves. As in many years past, emerging markets could be found both at the top and bottom of the list of the world's best performing stock markets. For instance, emerging markets swept the top 15 spots for annual performance measured in dollar terms, from a list of 76 world stock markets. Only Spain and Sweden from the developed markets made the top 20 on this list, which included 54 markets from developing countries and 22 from developed countries. The top five performers for 1996 were Bangladesh (up 196%), Russia (up 156%), Venezuela (up 132%), Hungary up 95%), and China (up 89%). It is noteworthy that the largest gains tended to come from some of the smaller, less-known emerging markets not contained in any index producer's composite index, though the relatively large Taiwanese market made 18 on the list with a 36% increase (Emerging Stock Market Fact-book 1997).

The worst performing markets were also concentrated in emerging markets. Twenty-one world equity markets dropped in price in 1996, of which 19 were emerging markets. Bulgaria was nearly wiped out as stock prices continued to post losses in dollar terms after trading was suspended from September 1996, in light of radical currency devaluation. As a consequence, the IFCG Bulgaria Index lost nearly 83% over the course of 1996, making it the world's worst performing stock market in 1996. Large emerging

markets like Korea, Thailand, and South Africa also suffered heavy losses, with their IFCI indexes falling 39%, 38% and 19% for the year in reaction to domestic economic problems (Emerging Stock Market Fact-book 1997).

Emerging markets' performance was mixed in 1997, with steep losses in Asia and strong gains in Latin America highlighting some of the disparities in emerging market equity performance. Overall, markets performed poorly in 1997, with the IFC Invest able Composite Index (IFCI) falling more than 16%, the sharpest one-year decline in the index's 10-year history. The sharp 57% fall in the IFCI Asia Index easily outweighed the 10% rise in the IFCI Europe/Middle East/Africa (EMEA) Index and the nearly 26% rise in the IFCI Latin America Index. The 32-market IFC Global (IFCG) Composite Index posted similar results to the IFCI Composite Index. The IFCG Asia Index fell 44%, less than IFCI Asia, largely due to strong gains in Chinese A-shares, which are not open to foreign investment. In contrast to emerging market returns, the U.S. S&P 500 surged 31 % for the year, beating all but eight of the 32 IFCG market indexes. Other developed stock market returns, with the exception of those in Asia, were generally strong across the board (Emerging Stock Market Fact-book 1998).

The top performers of emerging markets in 2004 are Russia (142.8%), Turkey (109.9%), Trinidad and Tobago (109.3%), Botswana (99.8%), and Hungary (60.9%). The top five losers of emerging markets in 1997 are Thailand (80%), Indonesia (74.1%), Malaysia (72.3%), Bulgaria (70.5%), and Korea (69.4%). However, Bangladesh was the 6 losers in 2004 by declining 67.7% (Emerging Stock Market Fact book 2004). Although there were only 93 companies listed in the Bangladesh capital market in 1988, which is not too bad in comparison to other emerging markets, for example, 205 in Chile, 483 in Egypt, 102 in Nigeria, 50 in Turkey, and 53 in Zimbabwe. However, the number of listed companies increased to 271 and 285 in Bangladesh in 2004 and 2005 respectively, which are pretty good compare to 245 and 295 in Chile, 656 and 650 in Egypt, 153 and 182 in Nigeria, 145 and 257 in Turkey, and 62 and 64 in Zimbabwe. Bangladesh achieved 87th position in the world ranking of the average company size whereas Nigeria ranked 79th, Zimbabwe 74th, Egypt 71st, Turkey and Chile 39th in the world average company size in 2004 (World Development Indicator 2004).

In addition, the value traded of Bangladesh was only US$940 million in 2005 whereas the value traded of Chile, Egypt, Nigeria, Turkey, and Zimbabwe were US$1610 million, US$460 million, US$905 million, US$801 million, and US$639 million respectively. The value traded of Bangladesh market increased to US$809 million in 2005 whereas the value traded of Chile, Egypt, Nigeria, Turkey, and Zimbabwe were US$5029 million and US$17445 million, US$1195 million and US$9859 million, US$140 million and US$1322 million, US$12191 million and US$89105 million, US$120 million and US$29 million respectively in 2004 and 2005. However, Bangladesh achieved 12.6% turnover ratio and got 60th position in the world stock market turnover whereas Turkey achieved 129.7% and got 7th position, Egypt achieved 33.5% and got 46th position, Zimbabwe achieved 19% and got 54th position, and Chile achieved 10.8% and got 61st position in 2004 (World Development Indicator 2004).

The pay-out ratios in the capital market in Bangladesh are excellent in comparison to other emerging markets. The dividend yield was 5.7% in Bangladesh in 1994, which is many times better in comparison to Indonesia 1.5%, China 2.3%, Philippines 0.4%, and Taiwan 0.7%. However, the dividend yield of Bangladesh reduced a little bit to 4.85% in 1995 and increased to 5.37% in 1997 but still kept the same position in the world emerging markets whereas the dividend yield of Indonesia, China, Philippines, and Taiwan were 1.5% and 2.9%, 3.2% and 1.3%, 0.6% and 1.4%, and 1.2% and 0.6% in 1995 and 1997 respectively (World Development Indicator 2001). Therefore, it is also clear from this part that the position of the capital market in Bangladesh is very good in comparison to all other emerging markets in all respects.

Table- 2.6: Pearson Correlation matrix of emerging cross countries based on all share price index:

Countries	DSE	Asia	East Europe	Europe & Middle East	Europe	Far East	Latin America	Ex Asia
DSE	1.000	.580	.419	.085	.130	.600	.242	.233
Asia	.580	1.000	.336	.026	.072	.987	.224	.259
East Europe	.419	.336	1.000	.858	.899	.212	.941	.946
Europe & Middle East	.085	.026	.858	1.000	.993	-.112	.952	.958
Europe	.130	.072	.899	.993	1.000	-.067	.962	.970
Far East	.600	.987	.212	-.112	-.067	1.000	.087	.119
Latin America	.242	.224	.941	.952	.962	.087	1.000	.993
Ex Asia	.233	.259	.946	.958	.970	.119	.993	1.000

Based on the value of correlation coefficient portfolio can be formed for minimizing level of unsystematic risk for Bangladesh with Europe & Middle East, Europe, Latin America and Ex Asia.

2.7. Regional markets vs. Bangladesh's markets

The stock market in Bangladesh has grown enormously during the last few years. But the size of the market is very small compared to the size of the other Asian emerging markets. The total market capitalization of Bangladesh was US$ 3.394 billion in 2005 compared to US$ 827.515 billion in India, US$ 22.263 billion in Pakistan, US$8191.778 billion in South Korea and $399.276 billion in Malaysia. However, the Bangladesh stock market is also very small compared to the size of the economy. The market capitalization in Bangladesh was only 6.3% of GDP in 2005, as against 25.77 percent in Pakistan, 24.03 percent in Sri Lanka, 108.23 percent in Thailand and 315.25 percent in Malaysia. Although the market capitalization of Bangladesh stock market increased to US$3.394 billion in 2005, which was approximately 15% of GNP that is still very low in comparison to the other regional countries (Emerging Stock Market Fact-book 2004-05).

Two other features of the underdeveloped stock market in Bangladesh are less liquidity of the market and smaller size of companies. Both of these two indicators improved significantly recently, but did not reach the level of other emerging markets. The turnover ratio, a measure of liquidity of the market, was 16.5 percent for Bangladesh in 2005, compared to 24.5 percent in India, 28.6 percent in Pakistan, 58.9 percent in Thailand, 59.8 percent in Malaysia and 176.2 percent in South Korea. The average size of companies in Bangladesh was only US$ 6 million at the end of 1997 and increased to US$ 7.5 million at the end of 2005 in terms of market capitalization. Bangladesh ranked 77th in 2004 and 87th in 2005 by average size of companies among 82 stock markets listed by IFC in 2004 and 96 stock markets listed by IFC in 2005. On the other hand, the average company size for Malaysia was US$ 132.2 million, South Korea US$ 54.0 million, India US$ 22.0, Pakistan US$ 14.0, and Sri Lanka US$ 8.8 million and ranked 41st 57th , 78th , 81st and 84th respectively by IFC in 2005 among the 96 stock markets. Therefore, turnover ratio and company size indicate that Bangladeshi capital

market's position is not so bad compared to other Asian markets (Emerging Stock Market Fact-book 2004-05).

The annual change in stock price index was significant despite decline in price indices in most of the South Asian markets. The stock price index in Bangladesh rose by 103.67% in 2004 and decreased by 14.91% in 2005. However, Bangladesh ranked as the top five performers by the change in price index amongst 76 countries in 2004 by IFC. On the other hand, the stock market index in India rose by 8.6% and declined by 2.7%, Malaysia declined by 23.8% and rose by 24.4%, Pakistan declined by 5.3% and 9.6%, Sri Lanka declined by 0.3% and 9.4%, Thailand declined by 19.2% and 5.4%, and South Korea rose by 18.6% and declined by 26.2% in 2004 and 2005 respectively. However, the Bangladesh stock market massively crashed in 1997 by losing 67.09% of its stock market index. In contrast, Indian market gained 16%, Malaysian market lose 52%, Pakistani market gained 28.9%, Sri Lanka market gained 19%, Thailand market lose 55.2%, and South Korean market lost 42.2% (Emerging Stock Market Fact-book 2004-05)

Table- 2.7: Comparative position of all share price index of regional markets ($):

YEAR	* DSE	CHINA	INDIA	INDONESIA	JORDAN	KOREA	MALAYSIA	PAKISTAN	PHILIPPINES	SRI LANKA	TAIWAN	THAILAND
1993	391.77	133.55	133.04	647.58	100.34	149.24	421.02	161.40	665.01	163.24	272.94	624.33
1994	845.65	70.58	145.14	472.82	91.21	182.26	333.77	148.18	610.02	156.85	326.71	554.75
1995	834.73	54.36	98.83	508.22	96.14	173.81	346.97	91.48	538.06	105.62	227.92	523.34
1996	2300.15	73.44	95.11	637.23	85.19	107.10	432.06	73.77	628.28	88.38	316.56	324.72
1997	756.78	54.05	104.23	162.19	83.67	35.08	135.63	91.61	232.65	98.57	294.75	83.36
1998	540.22	30.36	80.37	109.65	71.74	83.32	91.78	36.13	261.96	71.66	231.54	92.74
1999	487.77	33.38	148.42	210.57	73.18	158.45	194.21	51.39	268.06	64.68	350.81	136.09
2000	642.68	22.63	114.55	77.83	55.14	78.67	160.71	44.58	146.67	36.28	191.73	58.93
2001	829.61	16.74	90.29	69.36	71.14	114.84	164.33	28.98	117.77	49.38	208.55	60.64
2002	848.41	14.03	95.65	95.79	72.94	123.37	159.97	64.44	81.87	64.07	155.63	75.39
2003	967.88	25.41	166.35	162.82	113.37	163.59	196.95	84.48	113.79	91.04	217.90	176.61
2004	1971.31	25.21	193.73	235.34	180.39	196.24	220.21	91.76	141.23	98.14	232.14	169.47
2005	1677.35	29.23	262.26	264.90	309.76	302.76	216.85	143.59	169.39	128.27	239.76	177.68

Source: Morgan Stanley Capital International Inc & DSE annual report.

*** N.B. Index data of DSE (BD) is considered in terms of Tk.**

market's position is not so bad compared to other Asian markets (Emerging Stock Market Fact-book 2004-05).

The annual change in stock price index was significant despite decline in price indices in most of the South Asian markets. The stock price index in Bangladesh rose by 103.67% in 2004 and decreased by 14.91% in 2005. However, Bangladesh ranked as the top five performers by the change in price index amongst 76 countries in 2004 by IFC. On the other hand, the stock market index in India rose by 8.6% and declined by 2.7%, Malaysia declined by 23.8% and rose by 24.4%, Pakistan declined by 5.3% and 9.6%, Sri Lanka declined by 0.3% and 9.4%, Thailand declined by 19.2% and 5.4%, and South Korea rose by 18.6% and declined by 26.2% in 2004 and 2005 respectively. However, the Bangladesh stock market massively crashed in 1997 by losing 67.09% of its stock market index. In contrast, Indian market gained 16%, Malaysian market lose 52%, Pakistani market gained 28.9%, Sri Lanka market gained 19%, Thailand market lose 55.2%, and South Korean market lost 42.2% (Emerging Stock Market Fact-book 2004-05)

Table- 2.6: Comparative position of all share price index of regional markets ($):

YEAR	DSE	CHINA	INDIA	INDONESIA	JORDAN	KOREA	MALAYSIA	PAKISTAN	PHILIPPINES	SRI LANKA	TAIWAN	THAILAND
1993	10.01	133.55	133.04	647.58	100.34	149.24	421.02	161.40	665.01	163.24	272.94	624.33
1994	21.14	70.58	145.14	472.82	91.21	182.26	333.77	148.18	610.02	156.85	326.71	554.75
1995	20.76	54.36	98.83	508.22	96.14	173.81	346.97	91.48	538.06	105.62	227.92	523.34
1996	56.32	73.44	95.11	637.23	85.19	107.10	432.06	73.77	628.28	88.38	316.56	324.72
1997	17.72	54.05	104.23	162.19	83.67	35.08	135.63	91.61	232.65	98.57	294.75	83.36
1998	11.88	30.36	80.37	109.65	71.74	83.32	91.78	36.13	261.96	71.66	231.54	92.74
1999	10.15	33.38	148.42	210.57	73.18	158.45	194.21	51.39	268.06	64.68	350.81	136.09
2000	12.77	22.63	114.55	77.83	55.14	78.67	160.71	44.58	146.67	36.28	191.73	58.93
2001	15.37	16.74	90.29	69.36	71.14	114.84	164.33	28.98	117.77	49.38	208.55	60.64
2002	14.77	14.03	95.65	95.79	72.94	123.37	159.97	64.44	81.87	64.07	155.63	75.39
2003	16.72	25.41	166.35	162.82	113.37	163.59	196.95	84.48	113.79	91.04	217.90	176.61
2004	33.45	25.21	193.73	235.34	180.39	196.24	220.21	91.76	141.23	98.14	232.14	169.47
2005	27.86	29.23	262.26	264.90	309.76	302.76	216.85	143.59	169.39	128.27	239.76	177.68

Source: Morgan Stanley Capital International Inc & DSE annual report.

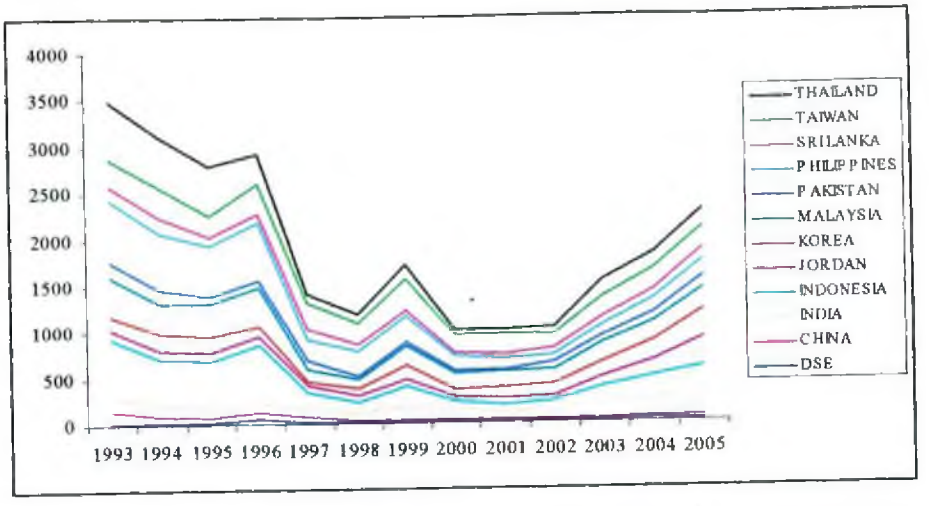


Figure: Comparative position of all share price index of regional markets

The price earning ratio in Bangladesh was only 22.45 in 2004 compared to 27.6 in Sri Lanka, 28.3 in Pakistan, 32.7 in India, 38.5 in Korea and 33 in Malaysia. However, the price earning ratio in Bangladesh increased to 24.73 in 2005 compared to 21.7 in Sri Lanka, 24.8 in Pakistan, 25.2 in India, 27.9 in Korea and 19.5 in Malaysia Emerging Stock Market Fact-book 2004-05).

As it has already been mentioned earlier that the pay-out ratio is extra-ordinary in Bangladesh comparison to any capital markets. The dividend yield was 5.34% in Bangladesh in 2004, which is many times better in comparison to India 1%, Pakistan 1.6%, Korea 1.3%, Malaysia 1.8%, Thailand 2%, and Sri Lanka 1.7%. However, although the dividend yield of Bangladesh increased a little bit to 5.38% in 2005, which kept the position of Bangladesh almost at the same level except the few whereas the dividend yield of India 2.8%, Pakistan 5.2%, Korea 3%, Malaysia 7%, Thailand 9.6%, and Sri Lanka 4.6% (Emerging Stock Market Fact-book 2004-05). The above information indicates that although the capital market in Bangladesh is small in size but Bangladesh is still performing very fine in comparison to the regional markets.

Table -2.8: Pearson Correlation matrix of regional cross countries based on all share price index:

Country	DSE	India	Indonesia	Jordan	Korea	Malaysia	Pakistan	Philiphines	Sri Lanka	Taiwan	Thailand
DSE	1.000	.154	.469	.308	.185	.495	.126	.300	.130	.251	.136
India	.154	1.000	.026	.898	.851	.035	.555	-.201	.416	.093	.034
Indo Nesia	.469	.026	1.000	.073	.244	.972	.644	.937	.717	.520	.901
Jordan	.308	.898	.073	1.000	.833	.048	.528	-.170	.417	-.049	.019
Korea	.185	.851	.244	.833	1.000	.270	.567	.029	.489	.031	.304
Malay Sia	.495	.035	.972	.048	.270	1.000	.598	.878	.636	.430	.874
Pakis Tan	.126	.555	.644	.528	.567	.598	1.000	.528	.957	.319	.728
Phili Phines	.300	-.201	.937	-.170	.029	.878	.528	1.000	.652	.598	.895
Srilan Ka	.130	.416	.717	.417	.489	.636	.957	.652	1.000	.423	.810
Taiwan	.251	.093	.520	-.049	.031	.430	.319	.598	.423	1.000	.395
Thai Land	0.136	.034	.901	.019	.304	.874	.728	.895	.810	.395	1.000

The correlation coefficients of DSE with India, Korea, Pakistan, Srilanka and Thailand are very low. So, there may be portfolio with these countries for minimizing portfolio risk of investment. The correlation coefficients of DSE with Jordan, Malaysia, Philippines and Taiwan are low. So, there also may be portfolio with these countries for minimizing portfolio risk of investment.

2.8. Corporate governance structure

Corporate governance is followed by the corporate policy makers to ensure the achievement of desired results. In a normative sense, it prescribes a code of conduct of the corporate behavior to all stockholders, external and internal. In another way, corporate is the process by which the capital market monitors the actions of corporate management and hold management accountable for its decisions. It provides a means of decision-making process, which maximizes value for the shareholders in a fully transparent manner. In the corporate context, governance issues are thrown into stark relief by events such as takeovers, shareholder's meetings and proxy contests, as well as controversies surrounding board composition and executive compensation. More routine decisions involving the allocation of physical, human and financial resources, capital budgeting, expansion of the firm's boundaries and labor negotiations are also affected by governance. It focuses on diverse elements of countries financial systems as the breadth and depth of their capital markets, corporate ownership structures and the law and regulatory environments and protection of outside investors, shareholders and debt holders by the legal system.

It implies that one or several investors may have minority stakes (10% to 20%) and this minority shareholder has the incentive to collect information and to monitor the corporate activity and thereby avoiding the free rider problem. Shleifer and Vishny (1986), argue that they have enough voting control to put pressure on the management. On the other hand, large shareholders have outright control of the firm and its management. Thus, large shareholder can address agency problem and ensure governance so that they have a general interest in profit maximization and enough control over the corporate assets.

In Bangladesh, the condition of management practices, internal control and corporate governance is very poor. In case of most of the companies, there is no effective structure for internal audit review and report on internal control and other operations, internal auditors have no freedom, no audit committee, no audit charter and no flawless financial reporting system.

2.9. Conclusion

Bangladesh still has potential for substantial rise in stock price and because of relatively lower stock price, the investments produce high dividend yield in the capital market in Bangladesh. However, Bangladesh market also showed signs of increasing maturity in terms of capital raising power. Almost all shares floated in the market were overwhelmingly subscribed approximately more than 36 times. The most impressive side of the capital market of Bangladesh is that even though the share price fell at times, aggregate value traded continued to rise with even rising market capitalization.

However, because of exemption of tax on dividend income and income tax incentives and high return level against the backdrop of low interest rate, local investors have involved themselves heavily in the securities market. Huge idle money is being geared to the stock exchanges making the securities market more liquid and vibrant than before. Moreover, Government is considering more augment steps to make securities market vibrant as it has already established itself as the most significant tool for the country's private sector development initiatives.

The capital market in Bangladesh successfully faced the aftermath of the Mexican crash and despite a huge off load of shares by foreign investors, the market did not collapse, rather its trading volume increased in multiple effect absorbing almost all those off loaded shares by the local investors. Although Seok and Park (1992) explain the underdeveloped nature of stock market of Bangladesh but the scenario has been changed in couple of years. Though the capital market of Bangladesh is very small in size and really at infancy stage in the list of capital markets but it is working very fine. During last few years, there is more or less stable position in trading volume and all share price index of the market.

CHAPTER - THREE

DHAKA STOCK EXCHANGE: AN OVERVIEW

3.1. Introduction

As a member of the emerging markets, the Dhaka Stock Exchange was not much stable since its formation but was rather volatile. The market grew at a slow but steady rate since 1976 and continued until 2005. However, the market lost about 25% in 1990 but regained and moved back to the position in 1991 and again continued with the steady growth rate until 1994. The market also took a short break in 1995 (DSE Daily Price Quotations 1976-95). Therefore these unstable trends of the market remind again and again that the market is not only dependent on country's economic factors but also largely depend on many other non-economic factors including internal political situations.

The most remarkable years for the Dhaka Stock Exchange are year 1996 and year 1997. In 1996 the DSE gained 196% and on the other hand, losses 68% in 1997. If 1996 was the phenomenal year of gains for Bangladesh equities, 1997 was equally impressive for its sizeable losses. Along with the regional financial crisis and local political turmoil, there was no reason for Bangladesh equities to gain in 1997. The forsaken state of the equities market resulted in a 67.1% loss for the DSE all share price index in take terms while the dollar based IFCG Bangladesh index crashed by 67.7% (emerging market fact book 1998, p.258). But for last few years there are steady changes in DSE.

The main purpose of this chapter is to highlight the major features of the Dhaka Stock Exchange. For this purpose, this chapter will basically focus on the main issues of the DSE and especially the issues related to this thesis and price behavior.

3.2. Background of Dhaka Stock Exchange

The Necessity of Establishing a Stock Exchange in the then East Pakistan was first decided by the Government early in 1952. It was learnt that the Calcutta Stock Exchange had prohibited the transactions in Pakistani shares and securities. The Provincial

Industrial Advisory Council soon thereafter set up an Organizing Committee for the formation of a Stock Exchange in East Pakistan. A decisive step was taken in the second meeting of the organizing committee held on the March 13, 1953 in the cabinet room, Eden Building, under the chairmanship of Mr. A. Khaleeli, Honorable Secretary Government of East Bengal, Commerce, Labor and Industries Department at which various aspects of the issue were discussed in detail. Discussion was on the then Central Government's proposal regarding the Karachi Stock Exchange opening a branch at Dhaka. The members in the meeting were not in favour to open an Independent Stock Exchange in East Pakistan. It was suggested that Dhaka Narayanganj Chamber of Commerce and Industry should approach its members for purchase of membership cards at Rs.2000 each for the proposed stock exchange. The location of the exchange was thought to be either in Dhaka, Narayanganj or Chittagong. An organizing committee was appointed consisting of leading Commercial and Industrial personalities of the province with Mr. Mehdi Ispahani as the convener in order to organize the exchange.

The chamber informed its members and members of its affiliated associations of the proceedings of the above meeting, requesting them to intimate whether they were interested in joining the proposed stock exchange or not. This was followed by a meeting, at the chamber of about 100 persons interested in the formation of the exchange on July 07, 1953. The meeting invited 8 gentlemen to become promoters of the exchange with Mr. M. Mehdi Ispahani as the convener and authorized them to draw up the Memorandum and Articles of Association of the exchange and proceed to obtain registration under the Companies act. 1913. The other 7 promoters of the exchange were Mr. J M Addision –Scott, Mr. Mhodammed Hanif, Mr. A. C. Jain, Mr. A. K. Khan, Mr. M Shabbir Ahmed and Mr. Sakhawat Hossin. It was also decided that membership fee was to be Rs.2000 and subscription rate at Rs.15 per Month. The exchange was to consist of not more than 150 members. A meeting of the promoters was held at the chamber on September 09, 1953 where it was decided to appoint Dignam & Co as a solicitor to draw up the Memorandum and Articles of Association of the stock exchange based on the rules of stock exchange existing in other countries and taking into consideration of local conditions.

Table -3.1: Historical development of DSE in chronological order

Year	Major event
1954	First established in the name of East Pakistan Exchange Association.
1956	Formal trading started at Narayangonj.
1958	Shifted to Dhaka at Narayangonj Chamber Building .
1959	Shifted to own building at 9F Motijheel C/A
1962	Renamed as East Pakistan Stock Exchange Ltd.
1964	Became Dhaka Stock Exchange Ltd.
1971	Suspended trading activities
1976	Resumed trading activities with 9 companies.

The 8 promoters incorporated the formation as the East Pakistan Stock Exchange Association Ltd. on April 28, 1954 as a public company. On June 26, 1962 the name was revised to East Pakistan Stock Exchange Ltd. Again on May 14, 1964 the name of East Pakistan Stock Exchange Limited was changed to "Dhaka Stock Exchange Ltd". At the time of incorporation the authorized capital of the exchange was Rs.300000 divided into 150 shares of Rs.2000 each. Then in an extra ordinary general meeting it was decided to increase the authorized capital to Rs.500000 divided into 250 shares of Rs.2000 each. The paid up capital of the exchange now stood at TK.3900000 divided into 195 shares of Tk.2000 each.

Although incorporated in 1954, the formal trading was started in 1956 at Narnyanganj after obtaining the certificates of commencement of business. But in 1958 it was shifted to Dhaka and started functioning at the Narnyangonj chamber building in Motijheel C/A. in October 1957. The stock exchange purchased a land measuring 8.75 Kattah at 9F Motijheel C/A from the Government and shifted the stock exchange to its own location in 1959. The Dhaka stock exchange (DSE) is registered as a public limited company and its activities are regulated by its articles of association, rules, regulations and bye-laws along with the Securities and Exchange Ordinance - 1969, Securities and Exchange Commission Act- 1993 and Companies Act -1994.

Table 3.2: Growth pattern of listed securities in DSE

Year	Listed companies	Listed securities (in mil)	Market capitalization)	Issued capital
1976	9	13.61	146.0	-
1977	11	14.65	248.5	-
1978	14	18.45	305.4	-
1979	17	21.23	393.7	-
1980	23	22.23	436.9	-
1981	26	26.65	603.2	-
1982	29	32.42	811.6	-
1983	49	44.37	1211.3	-
1984	58	62.35	2256.5	-
1985	69	86.45	3942.6	-
1986	78	99.59	5730.6	2653.05
1987	85	105.28	12635.1	3149.69
1988	93	123.06	13557.0	3663.69
1989	105	149.68	15351.0	45392.33
1990	116	161.37	11486.0	53611.00
1991	120	167.64	10397.0	5586.59
1992	128	172.34	12299.0	6020.34
1993	132	195.06	18098.7	5201.74
1994	150	241.5	41770.7	10661.86
1995	175	341.78	56518.14	174324.93
1996	191	397.43	168106.0	20627.04
1997	209	510.48	71255.54	26157.44
1998	228	504.16	50254.02	26813.43
1999	232	260.55	45483.38	27229.89
2000	241	640.28	62924.00	29916.00
2001	249	850.64	63769.00	32215.00
2002	260	1026.72	71261.75	34364.00
2003	267	1151.58	98587.00	45370.00
2004	273	1188.53	224923.00	48996.00
2005	285	1384.73	234211.73	55851.00

Besides, the market is growing in all aspects day-by-day and moving towards the maturity phase. A summary statistics about the overall growth and development of the DSE is presented in following table:

Table 3.3: Growth and development of DSE

Year	No. of listed com.	Market capitalization (mil. Tk.)	Trading value (mil.Tk.)	No. of shares issued	No. of shares traded	No. of IPOs	DSE Index
1993	132	18098.70	403.61	195085872	4373143	4	391.77
1994	150	41770.70	2442.87	240156945	11560837	26	845.65
1995	175	56518.14	4660.80	339855004	25947042	24	834.73
1996	191	168106.00	3150.00	394841035	103772874	24	2300.15
1997	209	71255.54	35411.53	512103096	119313228	12	756.78
1998	228	50254.02	34560.00	501066990	1015297101	8	540.22
1999	232	45483.38	38270.00	557107349	733817279	12	487.77
2000	241	62924.00	40270.00	640276000	949194473	8	642.68
2001	249	63769.00	39870.00	777756000	1104402160	11	829.61
2002	260	71261.75	34980.00	1026720000	1299440616	8	848.41
2003	267	98587.00	19470.00	1077916000	612739156	14	967.88
2004	273	224923.00	51760.00	1113924000	1538817583	3	1971.31
2005	285	234211.73	64860.00	1244142000	5175462568	17	1677.35

Sources: the Annual Reports of the DSE (1993-2005)

Dhaka Stock Exchange has been established with the following objectives

i. Providing a new source of finance for private domestic investment.

ii. Improving the company's financial risks.

iii. Improving the efficiency of investment by allocating finance to more efficient investors.

iv. Improving the level of savings

v. Benefits for institutional savers

vi. Foreign exchange gains that result from the inflow of funds overseas portfolio investors

vii. Encouraging privatization.

At present Dhaka Stock Exchange provides the following services

i. Listing of Companies. (As per listing regulations).

ii. Providing the screen based automated trading of listed securities.

iii. Settlement of trading. (As per settlement of transaction regulations)

iv. Gifting of share/granting approval to the transaction/transfer of share outside the trading system of e exchange(As per listing regulations 42)

v. Market administration and control.

vi. Market surveillance.

vii. Publication f monthly review.

viii. Monitoring he activities of listed companies. (As per listing regulations).

ix. Investors' grievance cell (Disposal of complaint bye laws 1997).

x. Investors' protection fund (as per investor protection fund regulations 1999).

xi. Announcement of price sensitive or other information about listed companies through online.

3.3. The listing requirements of DSE

The present process/way of listing, in short, may be presented as follows:

1. Every company intending to enlist its securities to DSE by issuing its securities through IPO is required to appoint Issue Manager to proceed with the listing process of the company in the Exchange;
2. The Issue Manager prepares the draft prospectus of the company as per Public Issue Rules of SEC and submit the same to the SEC and the Exchange(s) for necessary approval;
3. The Issuer is also required to make agreement with the Underwriter(s) and Bankers to the Issue for IPO purpose;
4. After receiving the draft prospectus, the Exchange examine and evaluate overall performance as well as financial features of the company which may have short term and long term impact on the market;
5. The Exchange send its opinion to SEC within 15 days of receipt of draft prospectus for SEC's consideration;
6. After proper scrutiny, SEC gives it consent for floating IPO as per Public Issue Rule;
7. Having consent from SEC, the Issuer is required to file application to the Exchange for listing its securities within 5 days of issuance of its prospectus;

8. On successful subscription, the company is required to complete distribution of allotment/refund warrants within 42 days of closing of subscription;
9. After 100% distribution of shares/refund warrants and compliance of other requirements, the application for listing of the Issuer is placed to the Exchange's meeting for necessary decision of the Board of DSE;
10. The Board of DSE takes the decision regarding listing/non-listing of the company which must be completed within 75 days from the closure of the subscription.

Highlights of DSE Listing Requirements:

Companies willing to expand market for their Securities may apply for listing with the Dhaka Stock Exchange (DSE) according to the manner prescribed in the Listing Regulations.

Highlights of the Listing Regulations of DSE are narrated below:

Eligibility:

a. The Company has to be a registered Public Limited Company
b. Minimum Paid-up capital has to be Tk. 10 million
c. Shares to be subscribed by a minimum of 250 nos. of subscribers.

Documents:

Papers to be submitted at the time of applying for Listing have been mentioned in the enclosed checklist.

Fees:

a. Initial Listing fee: An amount equivalent to one fourth of 1% of total paid-up capital.
b. Annual Listing Fee

Table shows the annual listing fees of companies based on paid up capital:

Slab of paid up capital (Mil. Tk.)	Annual required listing fees (Tk.)
0—10	10000
10—20	15000
20—30	20000
30—40	25000
40—50	30000
50—75	35000
75—100	40000
100—125	45000
125—150	50000
150—200	55000
200—250	60000
250—300	65000
300—400	70000
400—500	75000
500—600	80000
600—700	85000
700—800	90000
800—1000	95000
1000—above	100000

FORM-1

(To be printed on Company's Letter Head)

The Chief Executive Officer

Dhaka Stock Exchange Limited

Dhaka

Dear Sir,

We hereby apply for listing of our _____(name of the Company) on your stock Exchange.

Necessary information and documents as required in the Annexure to this form are furnished.

Yours faithfully,

_____

Signature & Address

Seal

c.c. The Securities & Exchange Commission.

ANNEXURE TO FORM 1

The following particulars and authenticated documents shall be annexed to the listing application, namely:

1. Memorandum and Article of Association and, in case of Participatory Redeemable Capital, a copy of the trust deed;

2. Copies of prospectus issued by the Company in respect of any security already listed on the Stock Exchange.

3. Copies of audited accounts for the last 5 completed years for a shorter number of years if the Company has been in existence only for such shorter years/period;

4. A brief history of the Company since incorporation giving details of its activities including any re-organization changes in its capital structure and borrowings.

5. A statement showing:

(a) Dividends and cash bonuses and/or bonus shares or right shares issued during the last 10 years or such shorter period as the Company may have been in existence;

(b) Dividends or interest in arrears, if any.

6. Certified copies of agreements or other documents relating to arrangements with or between:

(a) Vendors and /or Promoters

(b) Underwriters

(c) Brokers

7. Certified copies of agreements with:

(a) Managing Agents

(b) Selling Agents

(c) Managing Director and technical Directors

8. A statement containing particulars, duties of and parties to all material contracts, agreements (including agreements for technical advice and collaboration), concessions and similar other documents except those entered into the normal course of the Company's business or intended business together with a brief description of the terms of such agreements or contracts.

9. Certified copies of the agreements with the BSB, BSRS, ICB and any other financial institutions.

10. Name and address of the directors and persons holding 10% or more of any class of equity security as on the date of application together with the number of shares or debentures held by each.

11. Particulars of security for which listing are sought.

12. Additional information/documents that may be called by the Exchange.

3.4. De-listing and suspension

1. A listed company may be de-listed or suspended for any of the following reasons:

(a) if its Securities are quoted below 50 percent of face value for a continuous period of three calendar years. Provided that if the shares of the Company quoted at 50 percent or above of their face value then such a rate is maintained for a continuous period of thirty working days.

(b) if it has failed to declare dividend or bonus:

(i) for five years from the date of declaration of last dividend or bonus; or

(ii) in the case of manufacturing companies, for five years from the date or commencement of commercial production ; and

iii) for five years from the date of commencement of business in all other cases.

(c) if it has failed to hold its Annual General Meeting for a continuous period of three years;

(d) if it has gone into liquidation either voluntarily or under court order;

(e) if it has failed to pay the annual listing fees as prescribed in these regulations payable to the Exchange for a period of 2 years or penalty imposed under these regulations or any other dues payable to the Exchange to the exchange for a period of two years;

(f) if it has failed to comply with the requirements of any of these regulations;

(g) no company which has been de-listed or suspended shall be restored and its shares re-quoted until it removes the causes of de-listing /suspension and receives the assent of the Board or Exchange for the restoration.

2. No company will be de-listed under the Listing Regulations unless the company has been given an adequate opportunity or being heard.

3. Where no trading has taken place on the Exchange in the Securities of a listed company for a continuous period of 180 days, the Exchange, if it is satisfied that the prices quoted are not in accordance with the market realities, may except in cases where the earlier quotation is below par value and, with the prior approval of the commission, quote such companies at par from the one hundred and eighty First day, irrespective of the price earlier prevalent.

Table-3.4: Category-wise listed companies of DSE:

Group - A (141)			
1st BSRS	BEXIMCO	In Tech Online Ltd.	Peoples Insurance
1st ICB M.F.	Beximco Pharma	Information Services Network	People's Leasing
1st Lease International	Beximco Synthetics	Islami Bank	Phoenix Insurance
2nd ICB M.F.	BGIC	Islamic Finance & Investment	Pioneer Insurance
3rd ICB M.F.	BOC Bangladesh	Jamuna Bank	Pragati Insurance
4th ICB M.F.	BSC	Jute Spinners	Pragati Life Insurance
5th ICB M.F.	Central Insurance	Karnaphuli Insurance	Premier Leasing
6th ICB M.F.	City Bank	Keya Cosmetics	Prime Bank
7th ICB M.F.	Daffodil Computers	Keya Detergent	Prime Finance & Invest.
8th ICB M.F.	Delta Spinners	Kohinoor Chemicals	Pubali Bank
ACI Limited.	Dhaka Bank	Libra Infusions Limited	Purabi Gen. Insurance
Aftab Automobiles	DESCO	Meghna Cement	Quasem Drycells
Agni Systems Ltd.	Dutch-Bangla Bank	Meghna Life Insurance	Rangpur Foundry
Aims 1st M.F.	Eastern Bank	Mercantile Bank	Reckitt Benckiser(Bd.)Ltd.
Al-Arafah Islami Bank	Eastern Housing	Mercantile Insurance	Reliance Insurance
Al-Haj Textile	Eastern Insurance	Metro Spinning	Renata Ltd.
Ambee Pharma	Eastern Lubricants	MIDAS Financing Ltd.	Rupali Insurance
AMCL (Pran)	Eastland Insurance	Miracle Ind.	S. Alam Cold Rolled Steels Ltd.
Apex Foods	EL Camellia	Monno Ceramic	Sandhani Life Insurance
Apex Footwear	Export Import (Exim) Bank	Monno Jutex	Singer Bangladesh
Apex Spinning.	Fareast Islami Life	Monno Stafflers	Sonar Bangla Insurance
Apex Tannery	Federal Insurance	Mutual Trust Bank Ltd.	Sonargaon Textiles
Aramit	Fu Wang Food	National Life Insurance	Southeast Bank
Atlas Bangladesh	Gemini Sea Food	National Polymer	Square Pharma
Azadi Printers	Glaxo SmithKline	National Tea	Square Textile
Bangas	Global Insurance Co. Ltd.	National Tubes	Standard Bank
Bangladesh Hotels	GQ Ball Pen	NBL	Stylecraft
Bangladesh Lamps	Grameen M.F.one	NCCBL	Summit Power Ltd.
Bangladesh Online	Green Delta Insurance	Nitol Insurance	The Engineers
Bangladesh Plantation	Heidelberg Cement Bd.	Northern Jute	The Ibn Sina
Bank Asia	Hill Plantation	Olympic Industries	United Insurance
Bata Shoe	ICB	One Bank Limited	United Leasing
BATBC	ICB AMCL 1st M.F.	Orion Infusion	Usmania Glass
BDCOM Online Ltd.	ICB AMCLIslamic M.F.	Padma Oil Co.	Uttara Bank
Beach Hatchery Ltd.	IDLC	Padma Textile	Uttara Finance
Berger Paints			
Group - B (34)			
AB Bank	Chittagong Vegetable	Mithun Knitting	Rahim Textile
Agrani Insurance Co Ltd.	Confidence Cement	Modern Dyeing	Renwick Jajneswar

Alltex Ind. Ltd.	Dulamia Cotton	Monno Fabrics	Safko Spinnings
Anlima Yarn	Fu-Wang Ceramic	Niloy Cement	Saiham Textile
Anwar Galvanizing	H.R.Textile	Pharma Aids	Samorita Hospital
Apex Weaving	Himadri	Popular Life Insurance	Standard Ceramic
Asia Pacific Gen Ins	Imam Button	Prime Textile	Tallu Spinning
Bengal Fine Ceramic	Kay & Que	Progressive Life	Yousuf Flour
Legacy Footwear	Rabeya Flour Mills		
Group - G (1)- Lafarge Surma Cement			
Group - Z (93)			
Alpha Tobacco	Chic Tex Ltd.	Meghna Pet	Rupali Bank
Amam Sea Food (suspended)	CMC Kamal	Meghna Shrimp	Sajib Knitwear
Aramit Cement	Dandy Dyeing	Metalex Corporation(Suspended)	Saleh Carpet(Suspended)
Arbee Textile	Delta Life Insurance	Mita Textile	Samata Leather
Ashraf Textile	Desh Garments	Modern Cement	Savar Refractories
Aziz Pipes	Dhaka Fisheries	Modern Industries	Shaympur Sugar
B.Monospool Paper	Dynamic Textile	Mona Food	Shinepukur Holdings
Bangla Process	Eagle Box & Carton(suspend)	Oriental Bank Ltd.	Sinobangla Industries
Bangladesh Luggage	Eagle Star Textile	Padma Cement	Social Investment Bank
Bangladesh Services	Eastern Cables	Padma Printers	Sonali Aansh
BCIL	Excelsior Shoes	Paper Processing	Sonali Paper
Bd. Welding Electrodes	Fine Foods Limited	Perfume Chemicals	Sreepur Textile
BD. Zipper Ind.	Gachihata Aquaculture	Petro Synthetic	Tamijuddin Textile
BD.Autocars	German Bangla Foods	Pharmaco International	Therapeutics
BD.Dyeing	GMG Ind. Corp.	Phoenix Leather	Tripti Industries
BEMCO	Gulf Foods	Prime Insurance	Tulip Dairy & Food
Bengal Biscuits	Hakkani Pulp & Paper	Quasem Silk	UCBL
Bex. Denims	IFIC Bank	Quasem Textile	Wata Chemicals
Beximco Fisheries	Janata Insurance	Rahima Food	Wonderland Toys
Beximco Knitting	Lexco	Rahman Chemicals	Zeal Bangla Sugar
Beximco Textiles	M. Hossain Garments	Rangamati Food	Bd.Thai Aluminium
Bionic Sea Food	Maq Enterprises	Raspit Data Management	Rose Heaven Ball
BLTC	Maq Paper	Raspit Inc.(BD.)	Meghna Condensed
Al-Amin Chemicals			

3.5. Trading Policy and mechanism

1. Eligibility of a member for trading:

a. Becoming the member of CSE Clearing House;

b. Obtaining Dealership / Brokerage License from SEC;

c. Not otherwise barred by CSE or SEC.

2. Trading period

(a) Pre-Opening Session: Order entry, deletion/modification of limit orders is only permitted, execution of orders shall not be done during this session. The previous day's closing price and index will be available to the dealers/brokers during this session.

(b) Opening Session: During this session Matching of orders shall be done at opening price. The opening price of a security shall be the price at which maximum number of securities is matched. In the event of there being no trade for certain securities, then the last closing price for the security shall be made the opening price for the day. No order entry shall be permitted during this session.

(c) Continuous Trading Session: Orders shall be executed during this session and if an order can not be executed in whole or in part, then it will be stored as an unfilled order. Unfilled orders from the pre-opening session shall be carried forward with time stamp to this session.

(d) Closing Session: No order is received in this session. Pending orders executable at closing price and orders 'match at closing price' shall be executed in this session. The closing price for a security shall be determined as per the weighted average price of all the trades in the last 30(thirty) minutes before the closing session. If there is no trade during the above specified time, the weighted average price of maximum 50 (fifty) number of trades preceding the above 30(thirty) minutes shall be taken for determination of closing price. If there has been no trade in the security during the continuous trading session the opening price of the security shall be treated as the closing price.

(e) Close Price Trading Session: Only 'match at closing price' order and all executable pending orders shall be executed in this Session at closing price. If any 'match at closing price' order is not executed in whole or in part, it will be removed from the system automatically and all other pending orders except the expired ones shall be carried forward to the following Trading Day.

(f) Post Closing Session: The trading members will make enquiries, verify, and down load the daily transaction details in this session.

(g) Order types:

(i) Limit Order: A Limit Order is the order in which the buying price or selling price for a certain quantity of particular security is specified. Limit Order will be in the following categories.

(ii) Good Till Cancelled (GTC): A GTC order is the order that remains in the system for a period not exceeding one calendar week or the member cancels it.

(iii) Good For Day (GFD): A GFD is the order, which is valid for the day on which it is entered. If the order is not matched during the day, the order gets cancelled automatically at the end of the trading day.

(iv) Good Till Date (GTD): GTD order allows the member to specify the number of days not exceeding one calendar week for which the order shall stay in the stay in the system. At the end of this period the order shall be deleted from the system.

(v) Market order: Market Order is an order to buy or sell a certain quantity of particular security at the best price or prices prevailing in the market at that point of time.

Market orders will be in the following categories

Full Fill or Kill (FOK):

A FOK order is the order that will match for a trade at the Market Price only if the total quantity is available.

Partial Fill Rest Kill (PFRK):

A PFRK order is the order that will match for a trade at the Market Price for the quantity available in the market. The balance quantity, if any, will be deleted from the system.

Partial Fill Rest Convert (PFRC):

A PFRC order is the order that will match for a trade at the market price for the quantity available in the market. The balance quantity, if any, will be converted to a Limit Order at the last traded price.

Minimum Fill: An order in which the minimum quantity must be filled.

Market order protection: Market order protection is a protection, which will ensure that the trade price for market orders shall be within a certain price band (depending on the market order protection value). For a market buy order the market order protection value (which will be supplied by the member, when the market order is entered) will be relative to the BBO offer price and for a market sell order it would be relative to the BBO bid price.

Drip Feed Order: A Drip Feed Order is an order in which the member has the option to specify a replenish quantity along with the total order quantity. Only the replenish quantity is revealed to the market. The quantity gets replenished only when the previous quantity has got traded and every time the quantity gets replenished, the visible quantity gets a new time stamp.

Stop Loss Order: A Stop Loss Order allows the member to place an order, which gets activated only when the market price of the relevant security reaches or crosses trigger price. A stop loss order can be modified or deleted until it is not converted to a limit order.

Match at Closing Price Order: A 'Match at Closing Price' Order allows the Member to specify order to be executed at Closing Price.

Spot Order: Members shall be allowed to carry out spot order on CSE system arising out of closure of book or closure of the renunciation period of listed Companies. A spot order is traded against another spot order only.

Odd Lot Order: Any share quantity, which is not a market lot or multiple of market lots shall be called Odd Lot. While matching the system would match orders only if the quantity (odd) of the order is fully satisfied by one of the opposite order.

Bulk lot order: Bulk lot orders are multiple of market lot orders, which contain multiple number of certificates. Each of the Bulk lot order shall match with equal quantity and best price.

The minimum amount for a bid of bulk lot for a certain security shall be Tk 0.5 (point five) million at market price unless otherwise fixed by the Board time to time with the approval of the SEC.

Big Lot Order: Big lots are multiple of market lots inscribed in one single certificate. Each of the big lot order shall match with equal quantity and equal or better price.

Auction Order: Auction Order shall be an order entered by CSE. The Exchange will specify a rate with price brand for each security when putting the auction order. The auction orders entered by CSE cannot be modified or deleted once the auction session has started.

At the end of auction session, allotment of bid/offer will be made by CSE at best price. All non- allotted orders are removed from the system at the end of the Auction Session.

All bid for Odd lot, Bulk lot and Big lot shall be entered in two systems stating quantity and name of the security with price per share. The bid shall be accepted in the system during the continuous trading session only. The duration of these orders will be same as applicable for limit orders.

Order modification or cancellation

Amend Order: The price, volume, retention & client ID of an order can be changed prior to execution, or for any unexecuted portion of an order

Cancellation of Orders: Orders can be cancelled at any point prior to execution. All orders shall be automatically deleted from the system once their time condition has been expired.

Order Matching: During the trading day the system will match orders with existing opposite type of orders which have the best price. Waiting orders are required to be

matched in the following sequence: i) Best Price ii) Within Price, by time priority. The best buy order will match with the best sell order. The best buy order for a seller is the one with highest price and the best sell order for a buyer is the one with lowest price. An order may match partially with another order resulting in multiple trades.

Suspension of Trading: The CEO in Committee of DSE will have the authority to suspend trading of specific securities, trading by specific members or permit the resumption of trading activities in the security by the member from the terminal. The matter however shall be informed to the SEC immediately within the trading day.

3.6. Ownership structure

It is observed the closely held nature of the ownership in the Dhaka Stock Exchange because a large proportion of stocks held by insiders. However, Bangladesh government also plays a vital role in holding stocks in the DSE. Bangladesh government holds the major shares of some companies and small amount of shares of many of the companies. Moreover Investment Corporation of Bangladesh (ICB) also plays an important role in holding shares in the DSE.

Investment Corporation of Bangladesh, as an underwriter and as well as the operator of the capital market, it listed nine mutual funds in DSE. ICB holds a large number of shares of different companies. However among the institutional shareholders, the ICB is the major shareholder in Bangladesh. Moreover foreign owners are also largely holding shares of different companies. Even though foreigners do not hold the major proportion of shares but foreign ownership exists more or less in each and every company of the DSE. In addition, on an average the general shareholders are holding 25% of the shares of the market. Finally as we see the closely held nature of ownership in the DSE, which indicates clearly that the interest or position of outside owners (general shareholders) are unprotected. So it is assumed that the insiders usually maximize their own benefits through profit transfer and asset striping and consequently the firms go for higher amount of external financing. However it is also clear that the shareholders obviously get a very lower amount of dividends.

3.7. Group of companies

So far there are eight groups of companies in the DSE and each and every group of company has about 8/10 listed companies. Out of these BEXIMCO group is the largest in the DSE and this group is the most influential group in the DSE. BEXIMCO group consists of ten companies that are listed in DSE. Among them three are from pharmaceuticals and chemicals, four are from textiles, and one each from services and real estate, foods and allied, and miscellaneous sectors. Among other, APEX group, ISLAM group and MONNO group of companies are remarkable. It is worthy to mention that as the group of companies they are more powerful owners of the market. So they have a major influence on their group enlisted companies and as well as on the market as a whole. Therefore the closely held nature also confirms here by the higher amount of insider control here, which ultimately discourage payment in the market.

3.8. Clearing and settlement

The clearing and settlement module provides the management of trade from the point of entry into the settlement pool trade database until it has been delivered and settled and removed from the settlement pool. It consists of three major business processes.

Clearing: Participant trade reporting and affirmation, billing, assigning settlement instruction. **Settlement:** The process of overseeing that delivery of all instruments o the buyer and payment of all moneys to the seller has occurred before removing the trade form the settlement pool.

In our clearing and settlement system, new netting system was being followed form July 02, 2000. Some of the listed instruments had been placed in non-netting group and others were in netting group. The "day netting" system was continuing for the netting instruments. Non-netting group, which is in compulsory sport market, the transactions are not netted. The transactions are settled by depositing all the shares sold and paying full amount for the shares purchased. The recent amendment in regulation 4 of the settlement of stock exchange transactions regulation 1998 has been given effect time to time. Further new directive was made by SEC dated March 18, 2003 adjusted due position mechanism for settlement of scrip only as provided by regulations, 4(1) of settlement of stock exchange transaction regulations, 1998 shall remain suspended from

March 19, 2003 until further order. There is a complete picture of the settlement system for all of our 267 instruments in four groups in the four markets.

A group: Number of instruments are(131+08D+11M), here D for debentures & M for mutual funds (Trading in public market with trade for settlement facility for scrip only through DSE clearing House on T+1, T+3 basis).

Settlement for different categories of instruments

a) Group – A:

Market name	Trade for trade system (for script only)	Settlement & settlement period
Public	Trade for trade*	T+1 & T+3
Spot	Trade for trade	T+0 & T+1
Odd + block	Trade for trade	T+1 & T+3

As netting system for shares has withdrawn for A group instrument, member will have to deposit the full shares at the DSE on T+1after selling the shares, In case of purchasing such shares, the buyer will have to deposit the balanced (Netted) money at DSE on T+1.

b) Group – B:

Market name	Trade for Trade system	Settlement & Settlement period
Public	Trade for Trade**	T+1 & T+3
Odd + Block	Trade for Trade	T+1 & T+3
Spot (Before Book –closer)	Trade for Trade	T+0 & T+1

** Under the trade for trade settlement system, member will have to deposit the full money at DSE on T+1 after purchasing the shares, In case of selling such shares, the seller will have to deposit the full shares at the DSE on T+1.

c) Group – C:

Market name	Trade for Trade System	Settlement & Settlement period
Public	Trade for Trade**	T+1 & T+3
Odd Block	Trade for Trade	T+1 & T+3
Spot (Before Book-closer)	Trade for Trade	T+0 & T+1

Under the Trade for trade settlement system, member have to deposit the full money at the DSE on T+1after purchasing the shares, Incase of selling such shares, the seller will have to deposit the full shares at the DSE on T+1

d) Group – Z:

Market name	Trade for Trade System	Settlement & settlement period
Public	Trade for Trade **	T+4 & T+7
Odd +Block	Trade for trade	T+4 & T+7
Spot (Before Book-closer)	Trade for Trade	T+0 & T+1

**Under the trade for trade settlement system, member will have to deposit the full money at the DSE on T+4 after purchasing the shares, In case of selling such shares, the seller will have to deposit the full shares at the DSE on T+4.

3.9. Initial public offering (IPO)

Since 1993-94 a significant number of companies are using the market to raise capital. The market is now capable of handling big flotation. As the market is successful to attract the investors, new companies are relying more on the market rather that on blanks to raise capital. In 2004-05 public offerings of shares and debentures valued at Tk.438.5 million were made and against that there was a public response for Tk.1149.4 million. Even in the depressed market, most of the issues were over subscribed except one or two specialized issues.

3.10. Performance of Dhaka Stock Exchange

The two capital markets of Bangladesh are playing a vital role for industrializing in the country and overall economic development as well. Through these markets, companies are raising their required fund by issuing different types of primary securities. After issuing in the primary market these securities are traded in the organized stock exchanges. These stock exchanges are providing liquidity of securities and encouraging investors to trade. The number of companies issuing primary securities is increasing period to period. The volume of trade in amount and in number, market capitalization and overall indices of the two markets indicate the increasing role of capital market playing for the development of the country. Over a long period of time the performance of capital market i.e. stock exchanges of Bangladesh based on different criterion are presented below:

Table – 3.5: All share price index and return of DSE

Year	Index	% change based on 1993	Return (% change year to year)
1993	391.77	--	--
1994	845.65	115.85	115.85
1995	834.73	113.07	(1.29)
1996	2300.15	487.08	175.56
1997	756.78	93.17	(67.09)
1998	540.22	37.89	(28.62)
1999	487.77	24.50	(11.37)
2000	642.68	64.05	31.76
2001	829.61	111.76	29.09
2002	848.41	116.56	2.27
2003	967.88	147.05	14.08
2004	1971.31	403.10	103.67
2005	1677.35	328.15	(14.91)

From the table and graph it reveals that in Dhaka Stock Exchange based on year 1993 the all share price index has been fluctuated during the period of 1993—2005. From year 1993 to 1996 there is an increasing trend in the all share price index. In year 1996 there was an unusual increase in the share price index. After that the all share price was decreased radically in year 1997 and then there was again an increasing trend and year 2004 the index was gained significantly. The change in all share price index based on previous year is fluctuating. The highest % change in all share price index in DSE is in year 1996 that is abnormal condition of the market. The % change and the trend of all share price index are represented through the following graph:

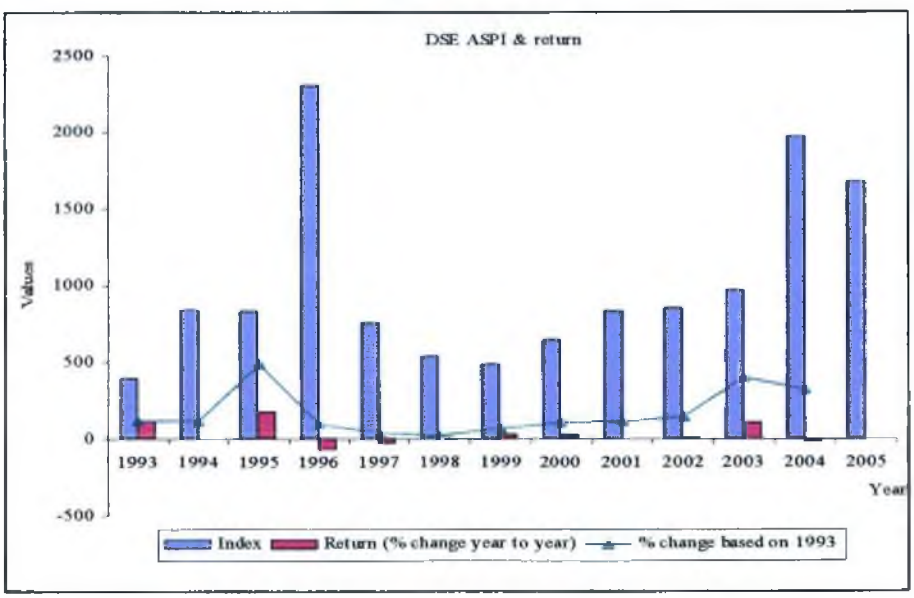
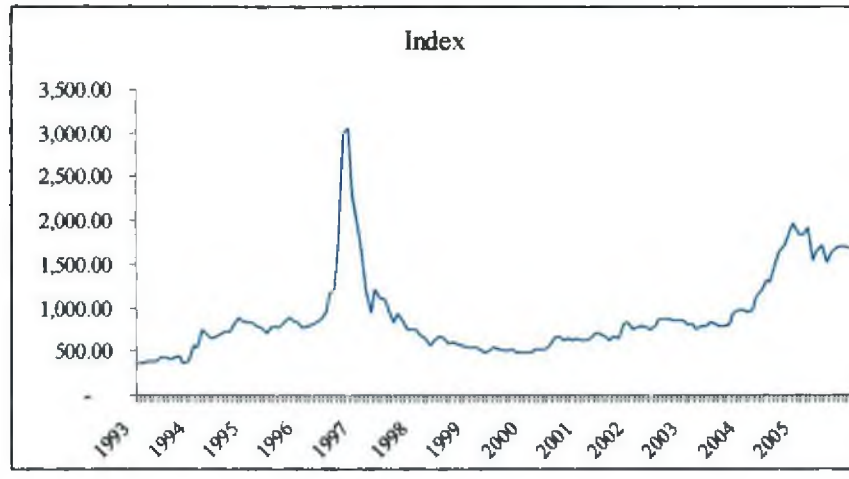


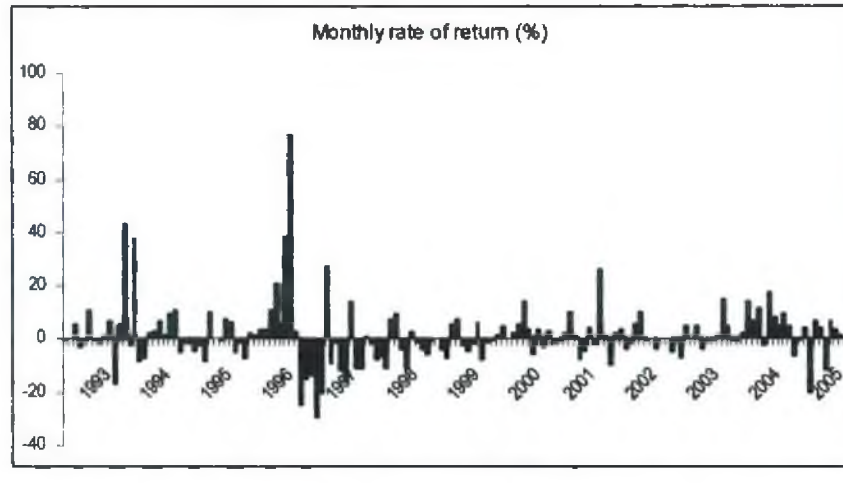
Table-3.6: Monthly rate of return of all share price index of DSE (1993—2005)

Year		MONTHS											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993	Index	369.12	370.34	390.01	378.95	377.06	418.75	418.31	410.06	416.96	445.73	371.78	391.77
	% Change in index	-0.11	0.33	5.31	-2.84	-0.50	11.06	-0.11	-1.97	1.68	6.90	-16.59	5.38
1994	Index	560.21	546.17	754.63	692.92	644.76	659.83	678.62	724.69	734.85	803.56	892.45	845.65
	% Change in index	43.00	-2.51	38.17	-8.18	-6.95	2.34	2.85	6.79	1.40	9.35	11.06	-5.24
1995	Index	834.48	823.02	784.66	765.88	702.96	776.88	780.26	778.22	836.78	887.99	844.14	834.73
	% Change in index	-1.32	-1.37	-4.66	-2.39	-8.22	10.52	0.44	-0.26	7.53	6.12	-4.94	-1.11
1996	Index	775.65	792.60	804.81	834.94	864.87	959.05	1156.18	1217.74	1690.25	2986.29	3064.99	2300.15
	% Change in index	-7.08	2.18	1.54	3.74	3.58	10.89	20.55	5.32	38.80	76.68	2.64	-24.95
1997	Index	1962.73	1702.49	1198.78	957.48	1216.68	1111.55	973.13	823.82	939.91	839.61	749.85	756.78
	% Change in index	-14.67	-13.26	-29.59	-20.13	27.07	-8.64	-12.45	-15.34	14.09	-10.67	-10.69	0.92
1998	Index	741.83	687.53	644.77	574.39	618.11	676.47	652.42	583.10	600.62	594.42	570.64	540.22
	% Change in index	-1.98	-7.32	-6.22	-10.92	7.61	9.44	-3.56	-10.63	3.00	-1.03	-4.00	-5.33
1999	Index	536.84	537.18	516.94	480.55	508.62	546.79	534.10	512.63	502.33	533.76	491.98	487.77
	% Change in index	-0.63	0.06	-3.77	-7.04	5.84	7.51	-2.32	-4.02	-2.01	6.26	-7.83	-0.86
2000	Index	484.44	493.55	517.83	519.47	532.91	561.00	639.26	660.93	623.20	644.11	625.52	642.68
	% Change in index	-0.68	1.88	4.92	0.32	2.59	5.27	13.95	3.39	-5.71	3.36	-2.89	2.74
2001	Index	633.45	607.43	626.00	642.04	705.69	716.06	662.47	633.82	661.81	647.90	815.52	829.61
	% Change in index	-1.44	-4.11	3.06	2.56	9.91	1.47	-7.48	-4.32	4.42	-2.10	25.87	1.73
2002	Index	749.11	768.03	795.05	763.70	752.91	792.56	874.57	870.46	874.22	842.36	845.07	848.41
	% Change in index	-9.70	2.53	3.52	-3.94	-1.41	5.27	10.35	-0.47	0.43	-3.64	0.32	0.39
2003	Index	807.60	806.92	750.84	787.94	791.70	830.46	799.98	793.12	788.88	801.27	920.61	967.88
	% Change in index	-4.81	-0.08	-6.95	4.94	0.48	4.90	-3.67	-0.86	-0.53	1.57	14.89	5.13
2004	Index	961.18	953.81	973.88	1112.19	1185.83	1318.92	1289.14	1513.29	1633.02	1710.45	1877.05	1971.31
	% Change in index	-0.69	-0.77	2.10	14.20	6.62	11.22	-2.26	17.39	7.91	4.74	9.74	5.02
2005	Index	1843.95	1835.62	1919.25	1537.87	1648.28	1713.17	1510.11	1613.17	1673.21	1694.62	1694.42	1677.35
	% Change in index	-6.46	-0.45	4.56	-19.87	7.18	3.94	-11.85	6.82	3.72	1.28	-0.01	-1.01

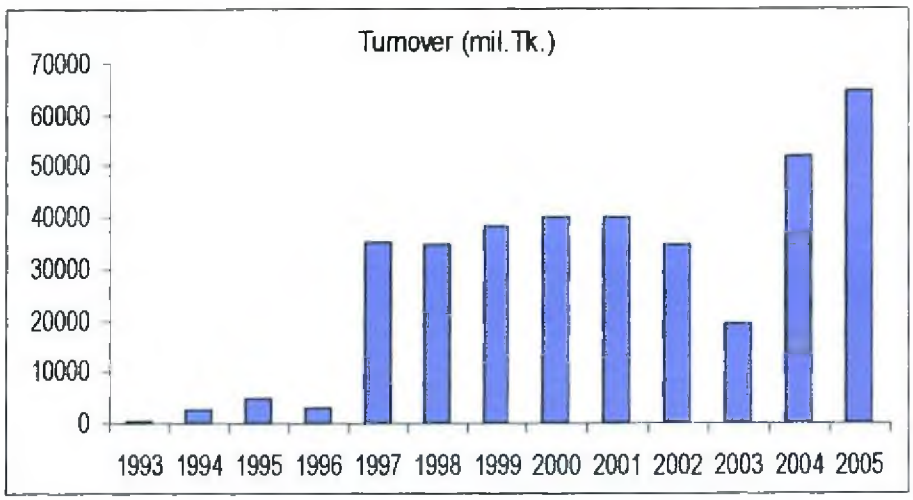
In the above table monthly returns for last 13 years (1993—2005) have been shown. Out of total 156 moths the returns calculated based on all share price index, returns for 75 months (48.08%) are negative and returns for rest 81 months (51.92%) are positive. From this, it reveals that there is average performance of the market.



The above graph represents the irregular trend in all share price index of Dhaka Stock Exchange from the year 1993 to 2005.



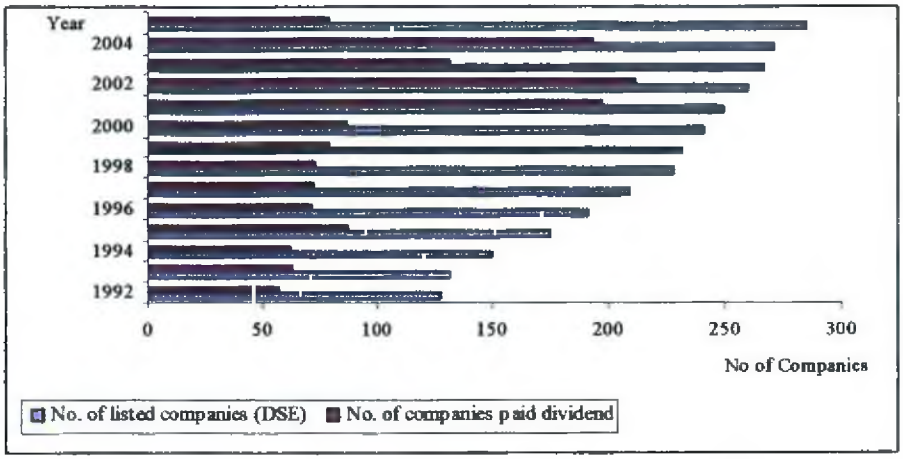
The above graph shows the fluctuating trend in monthly rate of return calculated by taking the percentage change in price from the year 1993 to 2005. The highest rate of return was in 1996 and highest loss was in 1997.



The above graph shows the volume of transactions in terms amount (Taka) from the year 1993 to 2005. Except year 2002 and 2003 there is an increasing trend in the transaction volume. The highest amount of volume of transactions was incurred in year 2005.

Table -3.7: Number of companies paid dividend

Year	No. of listed companies (DSE)	No. of companies paid dividend	% of companies paid dividend
1992	128	57	44.53
1993	132	63	47.73
1994	150	62	41.33
1995	175	87	49.71
1996	191	71	37.17
1997	209	72	34.45
1998	228	73	32.02
1999	232	79	34.05
2000	241	86	35.68
2001	249	197	79.12
2002	260	211	81.15
2003	267	132	49.44
2004	271	193	71.22
2005	285	79	27.72



The position of number of listed companies of Dhaka Stock Exchange and the number of companies paid dividend out of listed companies is shown in the above graph. There is an irregular trend in the number of listed companies and there is an increasing trend in the number of companies paid dividend. In year 2002 the highest number and percentage of companies paid dividend and the lowest number and percentage of companies paid dividend in year 1998.

3.11. Responsibilities of listed companies

The DSE considers that the listed companies have a great responsibility to sustain investor's confidence and protect their interests. Disclosures of their accounts transparency in their statements as well as availability of broader financial products will go a long way towards further strengthening the activities of the securities market. Bringing accounting standards to international norms has also become a priority whose implementation will help to improve investor confidence both local and international arena. It is worthy to note that the financial operations of the listed companies are gradually improving. In year 2005, only 79 listed companies out of 285 declared dividends ranging from 5% to 150% and showed better performance in their operations.

3.12. Payments of dividends

The figures show that even though as member of the emerging markets the payment pattern of the DSE listed companies is appreciating. Approximately 70% of the companies held AGM and 50% of the companies declare dividends in each year. However pay out rate is not too bad in comparison to other emerging markets. The average dividend rate is approximately 20%, which is better in comparison to the time deposit interest of Bangladesh.

3.13. Market participants

Generally low demand and supply condition prevails in Bangladesh, because of vicious circle of poverty. The savers, the issuers and the financial intermediaries are the parties essentially contributing directly to such underdeveloped conditions. The savers are not conscious of the securities market as a vehicle of investment. Many investors tend to relate the return on a stock to its dividend payment overlooking the possibility of capital gain. The notion of portfolio management based on risk-return, a concept which is familiar to investors in developed countries, is lacking among the investors of Bangladesh. Socio-political and economic instability in the country significantly contributes to the preference of hoarding money, precious stones, gold, real estate etc. The number of wealthy persons who could acquire the ownership of well diversified portfolios by investing in shares, debentures or other form of securities as required for sustaining a corporate securities market is quite few.

Investment banks, commercial banks, insurance companies are the major buyers and sellers of securities in the developed countries. However, their role is insignificant in Bangladesh. Commercial banks in Bangladesh are unwilling to hold non-government securities. Such holdings generally amounted to less than 1% of total deposits (Robins, 1980). The insurance Act 1938, limits the investment of life insurance fund mostly government securities and any other securities charged on the revenue of the government or guaranteed fully as regards principal and interest by the government. Besides, a sizeable investible funds from provident fund and trust funds, can not participate in the stock market as forbidden in section 20 of the trust Act 1882. Except for ICB, there is no reserve quota of new issues for institutions.

3.14. Flow of financial information in DSE

The Stock Exchange does not provide with sufficient information to the public about their rules and regulations of their function for lay-man. DSE's reporting on the performance of listed companies is not adequate for common investors (who have little experience about stock market) to understand the condition of the company. The AGM is not held in due time, most of the companies violate the norms and regulations of SEC (Security Exchange Commission). There is a lack of adequate information about the company's financial assets and future prospects. It is alleged that the yearly financial statements are not submitted by the companies to the stock exchange regularly.

3.15. Transaction cost

Dhaka Stock Market is a dealer market. The traditional trade mechanism cause high transaction cost as common in an inefficient market. Normally the transaction cost includes the explicit cost of trading a stock, i.e., commissions plus bid-ask spread (paul & Schultz -1983). But in case of Dhaka market, it needs to consider more elements in addition to the above transaction cost. It needs to offer advance money for purchase and sales & it takes 3 days to transfer the shares between buyer and seller. In case of selling, the sale proceedings will be received after 7 days. To transfer the ownership it takes minimum one week. Sometimes, no buy or sell order is taken by the brokers. So there results a high transaction cost in addition to commission because of high bid-ask spread and lack of quick transparency. The present explicit cost of trading securities is 0.3% to 1%.

3.16. Comparison with other markets

Before comparing Dhaka market with others markets, it needs to clear about the characteristics of efficient and inefficient market. Characteristics of an efficient market may be pointed out as investors are price takers, no transaction cost, no information cost, rapid adjustment of new events or information signaling, distributions of one-period percentage returns on all assets and portfolios are assigned to be normal or to conform to some other two-parameter member of the symmetric stable class, investors are assumed to be risk averse and behave as they choose among portfolios on the basis of maximum expected utility and ownership patterns are diversifiable.

Inefficient market may be defined as securities market which is speculative in nature and where the characteristics such as higher transaction costs, less information, slower to respond to investor need, low liquidity, thin trading, high bid-ask spread, lower transparency, extra risk associated with the market, e.g., other accounting based variables in the firm-level can determine stock prices in addition to systematic risk ,slow response to announcement effect and concentrated ownership are common. In a short,

"These somewhat more speculative securities market continue to grow, but are not yet of sufficient stature to offer a firm a secure source of funds, or to an investor a safe and secure place for investment. They usually have higher transactions cost, provide less information, are subject to increased inefficiencies, and slower to respond to investors need"(Maxwell, 1994, p.269).

Equity markets in the Asian area are less developed than those in Europe. With the exception of Japan, Australia and Hong Kong. The features of the Asian Market can be illustrated as:-

"Asian area is often quite thin, with only a comparatively small number of corporations listed on the exchange. Each tends to be more reflective of its host nation, and as a result , will very widely in trading rules, methods of market entry and egress, listing requirements and numbers of shares listed on the individual exchanges" (Maxwell,1994,p.268).

As for example, in tiny Fiji has no brokers; individuals meet and exchange shares among themselves whereas New Zealand (NZSE) has four regional trading floors. The efficient market may also be defined as:-

"An efficient market is obtained partially by having highly competitive, well-regulated and expert stock exchange"(Firth, 1977,p-155).

Though the Dhaka Stock Exchange is an organized market and appears to have all the formal organizational features of other markets in more developed countries, but in fact, when it compared with other markets in developed countries like NYSE (US), TSE(Japan), LSE (UK), it is most similar to the "over the counter" (OTC) markets in these countries. The US, UK and Japan securities markets in unlisted securities traded in the OTC market might be similar to those formally listed in the DSE in terms of high transaction costs, thin trading, difficulties in access and low liquidity. The ownership

structure of efficient market is also differed from inefficient because of lack of legal rules and regulations & failure to implement the existing one. For example, in UK. if one holds 3% of total shares then it is needed to declare but in an inefficient market there is no binding by rules and regulations. In case of inefficient market most of the companies having concentrated ownership is a usual picture. Another example may be important when we consider the role of dividend payments and its effects on value. In the case of the developed markets of the US and Europe, apart form possible personal and corporate tax rate differences on dividend and capital gains, the dividend payment effect is generally insignificant but in a highly inefficient market like the DSE, the situation may be quite different.

3.17. Conclusion

The stock market in the independent Bangladesh began its journey in 1976 by starting the activities of the DSE with only 9 companies. The growth of the market was relatively slow until 1982 but started to move up since 1983. The year 1996 was the year of the boom for the DSE but suddenly the market crashed in 1997. The main reason for that crash was the bad economic condition in the region. Apart from that the market is growing in size and moving up on a steady rate. However the payout ratio of the market especially cash dividend is about 20%, which is not too bad as an emerging market and in comparison with the bank interest in Bangladesh as well. Moreover, it is observed a closely held nature of ownership in those listed companies, which is really a bad news for the market as a whole. Although DSE is a baby in the list of capital markets but it is walking through step by step.

However, as already has been mentioned earlier that fully computers automated trading system established in the Dhaka Stock Exchange in 1998 and to get the full benefits of automation already has a central depository system been established. Since automation of the DSE daily turnover has been increased to as high as Taka 550.0 million and it is anticipated further growth in future, there may be requirement of establishing more central depository systems. The introduction of a CDS has eliminated the labor-intensive nature of the previous settlements by ending the physical delivery and execution of transfer deeds. Under this system all the securities are kept deposited at the CDS bank,

which records and transfer the securities from one account to another that reduces the risk of loss and duplication of papers.

Furthermore, the government of Bangladesh has recently reasserted their determination to plough ahead with the privatization of a number of SOEs as well as allowing pension and trust funds to participate in the market. For investors with an appetite for risk the rewards are tangible; as one venture capitalist recently pointed out, "Bangladesh is a venture capitalist dream compared to other economies in the region".

CHAPTER-FOUR

THEORETICAL FRAMEWORK AND LITERATURE SURVEY

Section 1: Review of Literature Related to Stock Price and Market Efficiency

4.1.1. Introduction

"*There is no question that theory must be complemented by inductive knowledge in practice,*" *(Shanken and Smith, 1996, p-102)*

Development of theory serves as the basis of research, but it is also true that each theory has its limitations and the empirical evidence for and against a theory is rarely clear-cut. Nevertheless, these problems then stimulate further efforts to develop new theories and new ways of empirically testing their implications. In this section, the most relevant theories related to market efficiency will be highlighted.

4.1.2. Capital asset pricing model (CAPM):

(a) Theoretical aspects:

Treynor (1961), Sharpe (1964) and Linter (1965), introduced the normative analysis of "Portfolio Theory" (Markowitz, 1952, 1959) to create a positive theory of the determination of asset prices. In portfolio theory, the Markowitz mean -variance portfolio selection model implied investors' demand for securities was given and assumed a fixed supply of assets. The model was then solved for security prices in a single period world with no taxes. Although total risk is measured by the variance of portfolio returns, Treynor, Sharpe, and Linter stated that in equilibrium an individual security is priced to reflect its contribution to total risk, measured by the covariance of its return on the market portfolio of all assets. This type of non-diversifiable risk associated with investing in risky ventures is called systematic risk.

In the 1960s the extension of the Markowitz mean-variance analysis to a competitive economy was a major development. Sharpe (1964), Linter (1965) and Mossin (1966) observed that, with market clearance, all consumers would choose portfolios that were a linear combination of the risk-free asset and the market portfolio. It can be said that equilibrium asset prices can be written as a linear combination of the bond prices and the market value of the portfolio. In other words, the expected rate of return from an asset can be written as the risk-free rate of interest plus the asset's normalized

covariance with the market times the difference between market's expected rate of returns and the risk free rate. This model estimate the required rate of return that will be applied as a discount rate for pricing of risky assets is known as the capital asset - pricing model (CAPM). For the first time finance theory had created a simple model relating to assets returns that could (in principle) be tested with econometric methods. By the late 1960s these tests were being carried out at the University of Chicago using the newly acquired CRSP share price data.

Sharpe, (1964), Linter (1965) and Black (1972) together developed the theory underpinning the capital asset pricing model, also known as the SLB model. Each of them reported a significant positive cross-sectional relation between average returns and betas. The simplest form of the capital asset pricing model can be expressed for the equilibrium expected returns, of a particular asset j:

$E(R_j) = R_f + [E(R_m) - R_f] \beta_j$

where,

$E(R_j)$ = expected rate of return of a particular asset j;

R_f = risk free rate of return/risk less rate of interest

β_j = risk factor (systematic) i.e. $cov(R_j,R_m)/\sigma^2(R_m)$. The covariance between the return on asset j and the market return divided by the variance of the market return, is the measure of systematic risk of asset j portfolio

$E(R_m)$ = expected rate of return on the market portfolio of all assets

$(R_m-R_f)\beta_j$ = risk premium

CAPM, predicts that systematic risk or beta is the single useful variable for predicting the cross-section portfolio. And for this reason, capital asset pricing theory means "*analysis of the determinants of asset prices under conditions of uncertainty*," *(Jensen and Smith, 1984 p-3)*

There are several research studies which have been devoted to extensions and empirical tests of the theory. Jensen (1972) provides a survey of much of the literature. Roll (1977) offers criticism of tests of the CAPM and Shwert (1983) provides a survey of size-related deviations of average returns from those predictions by the CAPM.

Thus, asset pricing theory defines the opportunity cost of capital for the firm's capital budgeting decision. There were also a number of major developments in finance theory in the 1970s. The first was a continuation of the CAPM research program, extended the model to a multi-period economy by Merton (1973a). Later, the introduction of restrictions on borrowing, Black (1972) and the introduction of transaction costs, Milne and Smith (1980) applied to a range of problems and issues in finance.

Capital market research has focused on various types of asset pricing models. The research on both the cross section and time series returns will be reviewed to see if the CAPM, or any of its implications, are supported by the evidence and whether any problems arise in estimating the return and evaluating the empirical evidence.

(b) Asset pricing theory and its implications for corporate finance:

The state of financial theory was supplemented by the development of capital asset pricing model, which finds new insights into the determination of stock returns. The first sign of a breakdown in the paradigm resulted from confusion as to how CAPM should be used to determine the appropriate value- maximizing investment criteria. This debate about the appropriate definition of price-taking behavior concerned the conditions under which investors in the corporation would be unanimous regarding its investment policy. It was eventually settled that such unanimity (in support of value maximization) would be achieved if a project's cash flows were spanned by existing securities in the capital market.

For the practice of corporate finance, asset pricing theory is directly relevant for capital budgeting decision i.e. CAPM can play two important roles in identifying a suitable cost of capital such as:

(1) Characterization of investments that can be viewed as close economic substitutes and thus should have similar expected rates of return.

(2) Estimation of the cost of capital or expected return for a given financial security or portfolio.

But asset pricing theory is indispensable where no objectives, close substitutes exist. In this case, a model like the CAPM would suggest that the risk of the projects depends on the sensitivity of the cash flows to changes in overall market conditions, if very sensitive, then the beta is high, the discount rate should be substantially above the risk

free rate; if generally low, the discount rate should be near the risk free rate. Thus the asset pricing model helps managers in the evaluation of cash flows in capital budgeting decision.

Asset pricing theory also plays an important role in cases where a suitable financial substitute has been specified, one must estimate the expected return on that investment. Even if one was to assume the investments expected rate of return or risk premium is constant over time, the variability of the surprise component of returns is generally so large that the precision obtained in estimating its expected value is limited. Thus a pricing model like the CAPM reduces the problem to estimating an investment's beta coefficient along with the risk premium on the market, increase estimation efficiency.

Although the CAPM contributed a lot to asset pricing theory, there was dissatisfaction with the empirical tests of the CAPM. The influence of earlier empirical studies (such as Black, Jensen and Scholes, 1972) and Fama and Macbeth (1973) still remains; the current consensus seems to be that a security's beta is still an important component of equilibrium pricing even though it may not be the only determinant.

Initial testing of the CAPM appeared to show that the theory provided a good fit to the data. However, subsequent work (Roll, 1977) showed that the predictive power of CAPM was exaggerated by the test methodology. Ross (1976) introduced the arbitrage-pricing theory as a generalized competitor to CAPM. Under APT, by amalgamating pure arbitrage and diversification arguments he showed that one could obtain asset prices as a linear function of a few basic factors. Potentially, the model appeared more flexible and robust than the CAPM and possibly reduced the testing problems associated with CAPM.

CAPM is a single period model that is difficult to apply in multi-period cases. The following two components are essential for applying CAPM:

(a) The choice of risk-free interest rate and

(b) The determination of the market risk-premium.

Both the CAPM and the APT consider one-month Treasury bill rate as the risk-less rate. But Brennan, (1996) provides theories of the term structure based on the expectation hypothesis suggest that a steeply sloping yield curve implies that the bill rate is changing. Another issue is the market risk-premium, there is now extensive evidence

that the market risk-premium varies over time with the level of interest rates. Brennan presented an empirically based but internally consistent, dynamic model of the behavior of interest rates and the market risk premium, that allows for determination of a term structure of discount rates using the CAPM, when both the risk less rate and the market risk premium vary over time.

(c) Empirical evidence of CAPM

The CAPM, developed by Sharpe (1964), Linter (1965) and Black (1972) (SLB), predicts that the market portfolio of invested wealth is mean-variance efficient (in the sense of Markowitz, 1959). The efficiency of the market portfolio implies that (a) expected returns on securities are positive linear functions of their market βs (the slope in the regression of a security's on the market's return) and (b) market βs suffice to describe the cross-section of expected returns. But there are several empirical contradictions of the SLB model. For example, the size effect of Banz (1981), who finds that the explanation of the cross-section of average stock returns, is provided by firm size measures rather than the market betas. Another contradiction of the SLB model, documented by Bhandari (1988) is the positive relation between leverage and expected returns. In the SLB model, leverage risk should be captured by market β, but Bhandari, finds that leverage helps to explain the cross-section of average stock returns in tests that include size (ME) as well as beta.

In the context of a structured asset pricing model, limited statistical power is a problem. For example, the weak relation between average return and beta over the relatively long (1941-90) period, (Fama and French, 1992), provide strong evidence against the CAPM. However, Kothari, Shanken and Sloan, (1995) point out that the standard error of the estimate is such that an expected risk premium of 6% per year is about as likely as no risk premium (also see Chan and Lakonishok (1992). In spite of this, when beta is estimated using annual rather than monthly data, t-statistics for the estimated risk premium typically exceed three. This is true even using the same portfolio formation procedure as Fama and French (Shanken and Smith, 1996). Even in light of this evidence, it is premature to simply abandon the CAPM framework.

Kothari, Shanken and Soalan (1995) find that a negative size effect (Banz. 1981) is still present in expected returns, even after controlling for the annual betas. So relying only

on estimated beta is probably not advisable. Size, however, is correlated with stock market beta and other measures of systematic (Chan, Chen, and Hsieh, 1985) and unsystematic risk. More generally, Beaver, Kettler & Scholes (1970) and Rosenberg & Mckibben (1973) suggest that using accounting data and other variables (rather than simply relying on the time series of historical returns) can provide better proxies for risk.

Another plausible argument can be made that additional factors, some of which are correlated with size, affect expected returns. For example, if liquidity is valued by investors, then illiquid assets must offer higher expected returns to induce investors to hold such assets (Amihud and Mendelson, 1986). On the other hand, required returns on assets that provide hedges against adverse shifts in investment opportunities may be lower (Long, 1974 and Merton, 1973). Rather than suggesting rejection of modern portfolio theory, these considerations extend and enrich the theory.

Fama and French (1992) and others indicate that financial ratios like book-to market equity and earnings are also related to expected returns. Ball (1978) has argued that financial ratios may be proxy for misspecifications in an asset pricing model like the CAPM and thus, emerge as significant in explaining cross-sectional differences in expected returns. Such misspecifications need not to be highly correlated with stock betas (Haugen, 1995). In addition to the above mentioned factors, misspecifications might be due to the use of a proxy for the true market portfolio (Roll, 1977) or it might be due to the differences in the taxation of dividends and capital gains (Litzenberger and Ramaswamy, 1979).

The Fama and French (1992) finding of a positive relation between a firm's book-to market equity ratios and expected return may be evidence of such misspecification rather than an indication of mispricing (Shanken and Smith, 1996). Fama and French (1993) explain a distress factor of the book-to -market effect related to investment opportunities. The statistical results are highly significant and such significance may arise spuriously from the process of continually searching for statistically significant variables, which characterizes much of the anomaly literature (Lo and Mackinlay, 1990). Davis (1994) finds a significant but substantially reduced (by about 50%) book-to market effect over the period 1940-1963. It might be due to the data-mining bias. The

data-mining problem underscores the essential role of theory in the process of developing expected return models and the danger of relying solely on empirical or "inductive" models (Shanken and Smith, 1996, p-103)

4.1.3. Efficient market theory/hypothesis (EMH)

(a) Theoretical aspects

"*Efficient market theory means the analysis of equilibrium behavior of price changes through time in speculative markets,*" *(Jensen and Smith, 1984, p-3).*

The abstract approach was to have a big impact on finance theory in sorting out ambiguity that had arisen over the efficient -markets hypothesis (EMH) .The idea of the EMH was first introduced by Fama (1970). Building on the earlier work of Samuelson (1965) and earlier writers, he argued that, in financial markets with free entry, no agent could make abnormal returns by exploiting publicly available information. The efficient market hypothesis holds that a market is efficient if it is impossible to make economic profits by trading on information already available to market participants. The idea had a profound impact on empirical finance research and the way the agents in financial markets viewed their role and performance (Brenstein, 1992).

Firstly Bachelier (1900) characterizes pricing in security markets as efficient. Although he anticipated the efficient market hypothesis and developed a model describing the pricing of options and the distribution of price changes, his contribution went unnoticed for over fifty years. Cowles (1932) documents the inability of forty-five professional agencies to forecast stock price changes. Another early work in the field by Statisticians such as Working (1934), Kendall (1953) and Osborne (1959, 1962) document that stock and commodity prices behave like a random walk i.e. stock price changes behave as if they were independent random drawings, which means that technical trading rules based on information concerning the past price series cannot be expected to earn the investor abnormal returns.

Samuelson (1965) and Mandelbrot (1966) provide the modern theoretical rationale behind the efficient markets hypothesis that unexpected price changes in a speculative market must behave as independent random drawings if the market is competitive and economic trading profits are zero. Their arguments were that unexpected price changes reflect new information, which by definition can not be deduced from previous

information and independent over time. Muth (1961) independently developed a hypothesis that unexpected price changes must be independent through time if unexpected economic profits are to be zero.

The efficient markets hypothesis is perhaps the most extensively tested hypothesis in all the social sciences. An important factor leading to the substantial body of empirical evidence on this hypothesis is the data made available by the establishment of the Center for Research in Security Prices (CRSP) sponsored by Merrill Lynch at the University of Chicago. The center created accurate computer files of monthly closing prices, dividends and capital changes for all stocks on the NYSE since 1926 and daily closing prices of all stocks on the New York and ASE since 1962 [Lorie /Fisher (1964) describe the basic data and its structure].

Consistent with the efficient market hypothesis, detailed empirical studies of stock prices indicate that it is difficult to earn above-normal profits by trading on publicly available data because it is already incorporated in security prices. Under the consideration of corporate view point:

"*An efficient market is one in which the market price is an unbiased estimate of the true value of the investment" (*Aswath Damodaran, 1997, p-420).

According to him, there are several key concepts of efficiency such as:

i. Market efficiency does not require that the market price be equal to true value at every point of time. But the requirement is that errors in the market price be unbiased; i.e. prices can be greater or less than true value, when these differences are random.

ii. The randomness of deviation (market price and true price) implies that there is an equal chance that stocks will be under or over valued at any point in time, i.e. it is not correlated with any observable variable. For example, in an efficient market, stocks with lower P/E (price-earnings) ratios should be no more or less likely to be undervalued than stocks with high P/E ratios.

iii. If the deviations of market price from true value are random, it follows that no group of investors should be able to consistently find under or over valued stocks using any investment strategy.

It is extremely unlikely that all markets are efficient to all investors but it is entirely possible that a particular market is efficient with respect to the average investor. It is

also possible that some markets are efficient while not others say as a direct consequence of differential tax rates and transaction costs.

Fama (1970, 1976) provides reviews of the evidence. Jenson (1978) however, shows that the evidence is not completely one sided and there are some anomalies. In spite of the similarities in language, most of the efficient-markets literature has been developed independent of the basic notions of the economic efficiency from welfare economics. Roll (1994) and Smith (1991) suggest a way of thinking about the gap and how to bridge that gap. By considering a market to be efficient the marginal investment in information will yield a normal rate of return. Such a definition is closely related to the Fama's (1971) notion of semi-strong form efficiency. Under this definition, the efficiency of a financial market is a special case of economic efficiency in any other market. Shanken and Smith (1996) believe that the equivalence allows a richer understanding of market efficiency.

(b) Efficient market hypothesis and its implications:

The efficient market hypothesis has several important implications for corporate finance such as:

1. There is no ambiguity about the firm's objective function: managers should maximize the current value of the firm, instead of not to choose between current value or future value and there is no reason for management to have a time horizon that is too short.
2. There is no benefit to manipulating earning per share, i.e. management decision that increase earnings but do not affect cash flows represent waste effort.
3. If new securities are issued at market prices which reflect an unbiased assessment of future payoffs, then concern about dilution or sharing of positive net present value projects with new security holders is eliminated.
4. Security returns are meaningful measure of performance, which allows scholars to use security returns to estimate the effect of various corporate policies and events on the market value of the corporation.

The extent to which financial markets fall short of this ideal of strong-form efficiency is a matter of discussion now. For instance, much evidence shows that managers have more information than is reflected in stock prices (i.e., they are infra marginal).

Investors are also aware of the fact & put on notice, as a result adjust market price, e.g. if managers announce an equity offer, investors rationally assumes a better condition & the price of the stock goes up. On the other hand, financing with debt might drop in price. As a result, ultimately price adjusts. In reality, if managers want to sell new equity simply because it is the most appropriate financing decision, that creates the opposite problem.

Problems also arise if management attempts to exploit its informational advantages. So the announcement of share repurchase assumes the investors that the managers have better access to information than they have, might concentrate their buying when share are under priced. The presence of such a large informed trader in the secondary market raises the anticipated information disparity, raises the equilibrium, bid-ask spread and lowers the value of the stock (Amihud and Mendelson, 1986 and Barclay and Smith, 1988).

Fama/Fisher/Jenson/Roll (1969) analysis of the effects of stock splits on the value of the firm's share, this empirical research has produced a rich array of evidence to augment positive theories in corporate finance. The reviews of the main empirical implications of market efficiency and the capital asset pricing model, suggests what would constitute empirical evidence for and against market efficiency and asset pricing models.

(c) Empirical Evidence of EMH

4.1.3.1. Insider trading strategy

Seyhun (1986) studies the behavior of stock prices around reported trades by insiders. Corporate officers, directors and very large stockholders are required to file reports of trading in their company's stock with the SEC. Seyhun finds that prices rise after insider purchases and fall after sales. Thus, there is reliable evidence that insiders have more information than is reflected in stock prices. There is also evidence that investors recognize the potential for management to exploit an informational advantage. For example, Seyhun finds no abnormal returns net of transaction costs from trading on announcements of insiders trades in filing with the SEC.

4.1.3.2. Contrarian investment strategy

Haugen's (1996) prescriptions for managerial behavior as well as investor's portfolio decisions, based on the concept that investors systematically overreact to information and that is subsequently corrected in a predictable manner. This type of over reaction even violates the semi-strong form of market efficiency. A contrarian investment strategy, which is based on the over reaction hypothesis, involves purchasing supposedly "under valued" losers that have had low returns in some past periods and selling off presumed "over valued" past winners. But the question arises if the securities are really over priced or under priced and their prices reflect the rational assessment of changes in expected future cash flows. Many researchers have examined the performance of the contrarian strategy (e.g., Choapra, Lakonishok and Ritter, 1992; and Debondt and Thaler, 1985).

4.1.3.3. Dividend evidence

Kothari and Shanken (1992) provide some relevant evidence without conducting a formal test, that the growth of dividends in a given year and the next three years accounts for about 80% of the cross-sectional variation in annual returns for portfolios formed by ranking stocks on their performance over the previous year. Specifically, extreme losers experienced dividend growth of -43% in the year of the loss while extreme winners' growth is 51%. This does not appear to be the result of managers erratically adjusting dividend in response to stock price movements, as average dividend growth over the next three years is just 1% for the losers and 25% for the winners. But by assuming inefficiency, an investor may construct a poorly diversified portfolio in anticipation of abnormal profits that never actually materialize (Shanken and Smith, 1996).

4.1.3.4. Value investment strategy (P/E)

Haugen (1996) argues that under the "value" investment strategy (buy low P/E stocks) it is likely to produce "similar relative returns in the future" based on the assumption that current price-earnings ratios reflect the same degree of investor mis-estimation of future growth that (in his view) existed in the past. The evidence concerning insider transaction, new securities issues and stock repurchase announcements does not support a view of financial markets as dominated by the naive investors who fail to learn from experience. Very often, the inefficiency which is attributable, might be due to the

limitations of a given research design or the related issues "data mining", Shanken and Smith, (1996).

4.1.3.5. Momentum

Another example opposite to the contrarian strategy is the trading on momentum, refers to the tendency to change that have gone up (down) to keep going up (down), (Jagadeesh and Titman,1993) reports that, over every imaginable horizon, short-term reversals at horizons, less than one month, persistence for 6-12 month horizons and long-term reversals at 3- 5 year horizons. While the evidence is consistence with the changing patterns of investor over or under reaction, there is no behavioral or other theory that predicts this observed pattern. Presumably, the advocates of behavioral "explanations" for financial phenomena would have embraced the opposite patterns with equal enthusiasm, since the measures of statistical significance were not adjusted to reflect authors searching among alternate specifications, reported measures of statistical significance should be viewed with much carefully (Shanken and Smith, 1996).

However, Ball, Kothari and Walsey (1995) argue that most of the short-term reversal evidence is just a reflection of biases related to the bid-ask spread and therefore, is not a basis for unusual profits. With regard to the long-term contrarian strategies Ball, Kothari and Shanken (1995) show that the reported profits are due in large part to the measured returns on very low-priced stocks for which transaction costs (including liquidity costs) are typically quite high but omitted from the analysis. The implication is that realizable trading profits are much lower than those reported in the academic literature.

Another difficulty in deciding whether some phenomenon is a manifestation of market inefficiency is the specification of an exact benchmark rate of return. Ball and Kothari (1989) and Chan (1988) show that adjustment for systematic risk reduces the apparent profits from Debondt and Thaler's (1985) five-year strategy substantially. Ball, Kothari and Shanken (1995) show, that the measures of contrarian abnormal performance in some sub periods is reduced by nearly 4 percentage points by using regression methods (Shanken,1990) that allow for predictable changes in conditional contrarian betas over time. Failure to take these important but subtle issues into account leaves a misleading impression of the implications of academic research for financial management (Shanken and Smith, 1996).

Shanken and Smith (1996) imply that inefficiencies are not totally absent from the market and strongly suggest two things:

1. Systematically detecting discrepancies between current price and true value in connection with widely recognized informational asymmetries is not a straightforward task.
2. Identifying the extent to which returns exceed a normal level of compensation for risk and other investment characteristics (such as liquidity) is likewise difficult, as evidence by evolution of the academic literature.

4.1.3.6. New revelations

According to Haugen, the new revelation is that stock returns are cross-sectionally predictable, which in and of itself, is inconsistent with neither CAPM nor EMH, but the nature of the revelations sometimes create some problems.

The first paradigm, CAPM, is "*The theory assumes that all investors optimize without restriction in mean-variance space and since aggregations of efficient portfolios are themselves efficient it predicts the efficiency of the market aggregate*". (*Haugen, 1996, p-86)*

And the second paradigm, "*Efficient market model or hypothesis (EMM), that prices reflect what is knownable about economic and financial conditions as well as the relevant characteristics of the companies that issued the stocks*".

CAPM predicts the systematic risk or beta is the single useful variable for predicting the cross-section & assumes the relation is positive. But in recent decades, it was documented that with the lowest beta stocks having highest returns. Based on the new results by Haugen and Baker (1996), it is almost certainly the case that the stocks with highest expected returns are far less risky than the stocks with lowest expected returns. In addition, most other studies reveal that the premium returns produced by the high expected return stocks tend to realized in seasonal patterns that are difficult for believers in EMM to explain. Finally, the sheer magnitudes of the return premiums suggest that they are induced by factors other than risk.

Variables other than beta such as ratios comparing the magnitude of market price to asset values at historical costs or current cash flows, have been found to be a much more powerful predictors of the differences in the future cross-section of returns. This result sets well with EMM but represent a complicated asset pricing model, if the predicting variables can be shown as proxies for risk. Haugen, (1996) classified the researchers view into three camps such as:

1. The researchers who do not find the new findings very interesting, they believe that the findings: (a) stem, at least in part, from bias in data or methodology (Kothari, Shanken and Sloan, 1995); (b) are merely the inevitable result of "data mining"(keep the computer spinning until you get an interesting result, then published) (Black,1993) ;or (c) are merely the products of the particular market index used to compute beta.(Roll and Ross,1992). Those in the first camp might accept or reject both CAPM and EMM but their views are not welcome by the new findings.

2. Those who believe the new results something interesting are under the second camp. They believe the cross-sectional differences they see in the returns are the expected realizations of risk-premiums (Fama and French, 1992, 1993). They still believe in EMM but search for more complicated versions of CAPM to explain what they have seen in data.

3. They believe that the premiums are the product of imprecision and bias in pricing by considering stocks with differential potentials for earning abnormal profit. True Abnormal Profit (TAP) as the best estimate of the amount and duration of a firm's future abnormal profit. Define Priced Abnormal Profit (PAP) as the amount and duration of abnormal profit reflected in the current stock price. In an efficient market TAP=PAP. In an imprecise market, different prices are assigned to firms with the same TAP and identical prices are assigned to firms with different TAPs. The market generally overestimates the length of time abnormal profit can be expected to persist for an average firm. In this environment, the market will tend to over price the high TAP firms and under price low TAP firms.

To support this contention members of inefficient market evidence that the growth of corporate cash flows are highly mean reverting. They claim that investors are not fully aware of this and upon seeing a sequence of good (bad) earnings reports, investors drive

the prices too high (low) based on the perception that the similar report coming in the future (Haugen, 1995) and after the over reaction, the stocks with high prices relative to current cash flows (growth stock) tend to under perform stock with low prices (value stocks). Those in the third camp reject EMH and believe that the effects of over reaction actually help to override the risk-related expectation of investors (CAPM or otherwise). The cross-sectional return differentials between growth and value stocks are unexpected. Investors are consistently surprised by the relative future performance of the winners and losers of the past, but they fail to catch on to their pricing bias because they notice the relative performance over relatively short time horizons.

4.1.3.7. Book value to market price ratio:

The negative relationship between risk and return for large stocks was first reported nearly 20 years ago by Haugen and Heins (HH) (1975). Given the nature of their sampling technique, HH unwittingly observe the relationship between risk and realized returns for large established firms. They find that the relationship between risk (risk and volatility) and realized returns are negative and significant for equally weighted portfolios over the periods 1926-1971, 1946-1971, and various sub-periods within for large size and beta are obviously highly correlated .This will cause a multicollinearity problem in all regressions where size and beta appear together, which will make it difficult to interpret the coefficients on each variable. In, Jagadeesh (1992), portfolios are constructed to minimize the co linearity between size and beta. In multiple regression with both variables, Jagadeesh finds a significant size effect but a negative (but non significant) relationship between beta and realized monthly returns over the period 1954 through 1989. Jagadeesh uses the CRSP database for his analysis, which is free from survival bias.

Fama and French (FF) (1992) find that when stocks are ranked by book-to price, the high book-to-price ratio firms (value) tend to produce surprising high rates of returns and the returns to low book-to-price firms (growth) are surprisingly low. Bias, not merely imprecision is necessary to produce these results. Furthermore, with considerable imprecision in addition to bias, many growth stocks with TAP>PAP will have positive excess expected returns. According to Haugen (1996), those in the second camp, may argue that the premium to high book to market firm's is the result of neither bias nor imprecision in pricing, rather it is the result of risk premium.

Another troublesome aspect of the new aspect of the new evidence is the fact that variables, like market beta, that are supposed to be important in the cross-section are weak and even perversely related to expected returns. FF (1992) ranks their stocks first by size and then formed deciles. Then within each size group, stocks are ranked by beta and formed into deciles. The result is a manifestation of a size premium not a risk premium. Small stocks carry bigger expected returns and tend to be riskier, but their superior returns are driven by size and relative trading costs rather than by market risk. To show this, FF takes each of their size groupings and ranks the stocks in them by beta in each of the years. For example, the largest deciles stocks are grouped into beta sub-deciles. Then the monthly returns for each of the sub-deciles are observed over 1941-1990, and beta is plotted against average returns. The evidence shows that within the largest stocks, those with highest risk tend to have the lowest returns. And the same is applicable for the smallest stocks. FF argues that market beta is not a sufficient measure of risk. They would argue that investors care little about beta and focus instead on other risk measures.

Some believe that the results of FF (1992) are due to survival bias in their data, because FF uses the COMPUSTAT tapes in their analysis. In 1987, the coverage in this database was greatly expanded to include 6000 companies, most of which was trade on the over-the counter markets. All of the additional companies were in existence in 1978. However, no companies were added that existed prior to 1978 but not in 1978. Many of the stocks not included may have had high book to market ratios and subsequently went out of business. These failed firms would not be reflected in the FF tests, biasing the performance of these types of firms upward. Since the grouping of FF is equally weighted, the effect of this bias is potentially severe.

But this is not the end; the returns are shown to be strong even after the survival bias problem is eliminated. For example, Haguen and Baker (HB) (1996) base their test on a population matched to the actual history of the names in the Russell 3000 stock index. They are able to cover approximately 98% of the names in the index. Moreover, their high return deciles are made up of large, liquid companies for which the attrition rate is likely to be very low. Survival bias is extremely unlikely to account for the large premium returns that they find. HB finds that the stocks in their high-return deciles have

an unambiguously low-risk profile. Their high- deciles stocks collectively have low betas and volatility of return, low debt and high interest coverage, large market capitalization, high liquidity, and high profitability, but these stocks nevertheless sell at relatively cheap prices relative to dividends, earnings, and cash flows. In building their high-return deciles, HB take advantage of the market's apparent tendency to price with both a high degree of imprecision and bias. After adjusting risk the returns with FF's three-factor model, HB actually find that the excess returns become larger not smaller. Furthermore, HB's high -return contains stocks that, overall, look more like growth stocks than value stocks.

4.1.3.8. Market volatility

Haugen (1995) presents evidence that the payoff to a stock's contribution to portfolio volatility was positive in the 1930s and 1940s, but it changed sign and became consistently negative after the late 1950s. Interestingly, the change in sign was coincident with the institutionalization of the market and the rise of fiduciaries as a dominant player. The behavior of fiduciaries may be affected by the agency problems relative to their clients. As for example, clients frequently are curious about the rationale behind a fiduciary's investment strategy. As a result, fiduciaries may be attracted to stocks associated with interesting and exciting prospects, upon which they build captivating stories and investment themes for their clients. It is quite plausible that the flow of information affecting the prices of these interesting stocks might be abnormally high relative to their dull counterparts. Another surprise is the seasonal effect, which came into action at the turn of the calendar year or the announcement of quarterly earnings.

4.1.3.9. Earnings announcements

A recent study concerning earnings announcement, by Jagadeesh and Titman (JT) (1993), classify stocks as winners or losers, and then they measure the stock's subsequent relative performance. The JT study covers the period 1980 through 1989. Thus it avoids the 1978 survival bias (mentioned in FF) problem in the COMPUSTAT tapes. The study includes all firms listed on the NYSE for which the required data were available. Winners are defined as the 10% of the stocks in their sample having the best returns over the past six months and losers are defined as the 10% having the worst returns. JT then observed the relative performance of the winners and losers over the

next 36 months. In each of the 36 months, they measure performance for firms that report earnings in the month and for those firms, returns are measured only during the two days preceding and the day of the announcement of quarterly earnings per share. In the first month, following the ranking of the winners and losers, JT would focus only on those firms reporting earnings in that month. For these firms, they look at the difference between the returns for winners and losers only in the three day vicinity of the announcement dates. The winners of the past do better in the first month following the classification based on previous six months that follow. The winners to have reported good earnings in the tailoring six months period; the losers are bad, relative to market expectation which is termed as" surprise". Until seven months, winners outperform the losers i.e. the subsequent good or bad reports catch the market by surprise, and the market participant's failure to recognize that quarterly reports foretell of a few more good ones to follow and vise versa. But,

"a rational, efficient market would be aware of this tendency, anticipating the good and bad reports in advance and not reacting upon their arrival," (Haugen,1996,p-90)

The pattern reverses after the eight months. After the eight months, the market is being pleasantly surprised at the unexpectedly good reports of the past losers and bad reports by the past winners. Those who believe in efficient market and CAPM argue that the relative risk of growth and value stocks changes during these periods and the relative returns premium are the results of risk premium. And the "over reaction" at the same time believes an inefficient market's failure to recognize the actual performance.

4.1.3.10. Seasonal effect

"On the morning of the first trading day of the year, the starter's gun is raised into the air and fired - the race to beat the market is on for a fresh calendar year," (Haugen,1996, p-91) .

Debondt and Thaler (1985), show that long-term losers of the past tend to outperform long-term winners in subsequent period. They find an important clue in the timing of realization of premium returns, which is earned entirely in the month of January.

" ..... *reversal behavior of stock prices ;i.e., the prior period 's worst stock return performers(loser) outperform the prior period's best returns return performers(loser) outperform the prior period 's best returns performers(winners) in the subsequent period is the violation of efficient market hypothesis known as "overreaction*

phenomenon," because it suggest that market has overreact in the initial period correct itself in the subsequent period". (Paul *zarowin, 1990.p.131)*

Debondt and Thaler (1987) found that the winners average market values of equity is almost twice large as losers on an average but there is no statistical test for the equality of size between the groups. There is evidence suggesting that the relation between the size and overreaction phenomenon demands further investigation.

Motivated by these findings, Zarowin (1990) re-examined Debondt and Thaler's evidence on stock market overreaction, controlling for size differences between winners and losers and found that when the losers are smaller than the winners they outperform the winners; when winners are smaller they outperform the losers. Thus their results show that differences in size and not the investor's overreaction are driving the winner versus loser phenomenon, regarded as an efficient market anomaly. Thus the extent to which prices are informational efficient is a subject of numerous studies. Some of the strongest evidence challenging the hypothesis that security prices are informational efficient comes from the "anomalies" literature, which has discovered puzzling patterns in the behavior of asset prices ,such as Monday seasonal in equity returns .Equity returns on Monday are significantly negative and lower than on other weekdays. The seasonal raises the possibility that many investors follow irrational trading patterns and rational traders cannot eliminate their effect on the price system.

4.1.3.11. Factor model to predict stock prices

Factor models are designed to estimate and predict the influence of various factors on stock returns. The factors may be firm characteristics, such as the size of the firm or its book-to market ratio. According to them firms with larger market values usually have lower returns. The payoff to size, is therefore, usually negative. It is also known that the firm's with larger book-to market ratios usually have higher returns. The payoff to the book to market factor is therefore, positive. HB (1996) reports that the out-of sample predictions of the cross-section of stock returns are highly accurate, with realized spreads between the high and low expected return deciles that average 35%. Five classes of factors are employed in the model, risk, liquidity, price-level (relative to current cash flows), growth potential or current profitability and the technical history of stock price behavior. They find that the payoffs to liquidity are negative, with less liquid stocks having higher expected returns. The payoffs to price level are positive, with

stocks selling at low prices relative to current cash flows and accounting numbers, such as earnings, dividends, and book values, having higher expected returns. The payoffs to profitability or growth potential are also positive; given a stock's price level, the greater its current profitability or potential for future growth, the greater it's expected return. In terms of technical price history, they find negative payoffs associated with performance over the tailoring three months, positive payoffs associated with performance over the tailoring six to twelve months, and negative payoffs associated with performance over the tailoring three to five years. HB find that the payoffs to liquidity, price level, growth potential, and the technical history are very stable in sub periods. They also find that the payoffs are common in sign and are common across the five major markets of the world: the U.S., Japan, U.K., France and Germany.

4.1.3.12. Implications of the new evidence for corporate finance

The objective function of corporate finance is to maximize shareholders' wealth. In setting standards in the context of this study managers need to make decision in three cases, such as investment decision (cost of capital), financing decision (the capital structure of the firm) and in deciding distribution of cash flows (dividend policy). For the purpose of deciding the investment prospect, managers need to decide the expected rate of return on stock. Given the lack of evidence supporting its prediction, managers probably rely on theoretical models such as CAPM. However, inductive models, such the factor model, may be used for making managerial decisions in such areas as investment decision, financing decision and dividend decision.

4.1.3.13. Investment decision

Given the superior out-of-sample predictive power of an inductive factor model relative to the theoretically-based CAPM, managers should find it to their advantage to employ inductive model to compute the cost of equity capital. In using a factor model of this type, managers must determine the "exposure" of the firm to a particular factor, e.g. how big is the firm or what the ratio of book to market value is and also project the payoff to each factor in the coming period. That projection will probably be based on the monthly history of the factor payoffs. The projection may be based on the simple average of the past payoffs and using time series models.

Based on this publicly available information, the factor model may be forecasting a high return based on the individual characteristics of the company. However, management may know that the current profile of the characteristics of its company may be deceiving. In the course of the next two years, the company may be introduced hot products that are bound to change the stock market's assessment about its prospect. Based on this inside information, when management thinks that the risk adjusted return on the company's stocks are undervalued, management should forego the investment and use the money to buy back the stock, unless it can be found that other financial investment are better than the stock. Another factor is to be considered if the firm's investment in its own stock is tax free. The stockholders remain after the repurchase of shares will have their shares appreciate because of management's decision. The trade associated with such a move should raise the share price upward. The management's decision to buy back the stock may send a signal to the market about under valuation may cause the market to revise its expectation as well as the prices.

In making capital budgeting decision, management should consider investment alternatives both in real and financial sectors. In an inefficient market, armed with the state-of the-factor models, management may see financial investments with very high risk-adjusted n-period expected rate of returns. Management's own stock may be one of these, specially only in the case of private information and for the firm, it is a tax-free investment. These n-period expected returns should be compared with the alternatives in the real sector. Assuming away attendant problems associated with mutually exclusive investments, issues of signaling, agency problems and other factors that create independence between the investment and financing decision, management should opt for the investment with the highest after-tax, risk-adjusted expected returns, provided the higher than the expected returns on the lowest-cost bundle of securities used to finance.

4.1.3.14. Financing decision

Bias and imprecision in market pricing may also play an important role in decisions relating to the finance of the firm. The Modigliani-Miller (1958) assume indifference theorem that financial securities sell at zero net present values. Assumption of undervalue assets means the present value of the firm is positive. To finance the firm's investments, management can choose undervalued stock or debt. Debt is usually

undervalued than the stock because of its fixed nature of claim and holding other factors constant, as a general policy, managers should favor debt over equity financing. In an efficient market there is an optimal form of debt. Management can turn the mispricing of bonds to an advantage through the use of options. Management can make the bond both callable (it can buy the bond from the bondholders at a fixed prices) and putable (the bondholders can turn the bond back to the management at a fixed price). Given the firm's undervalued assets and overvalued put, its sale to the bondholders mitigate the under valuation of the overall financial package. By adjusting the terms on the put and the call, management can eliminate undervaluation of the package and turn a market disadvantage into an advantage.

In considering the costs of raising capital through their firm, managers should employ state-of-the-art inductive technology (supplemented with their own inside information) to forecast the expected returns to their firm's menu of prospective futures. Given the current state of the field, this technology should not be based on theoretical models. Rather, management should be confident that the technology is truly state-of-the-arts in terms of its power to predict future returns out of sample. Based on their analysis, management should determine the least expensive bundle of securities that can be issued. As long as the market prices are mispriced (under or over valued), the firm should be able to create security bundles that are overvalued. In finding the least expensive security bundle, it does not matter what security holders want or the required return to be, but the matter is what management believe and what are going to be.

4.1.3.15. Dividend decision

Dividend policy concerns the choice of paying less cash dividends and repurchasing more of the firm's stock or not. If management pays more dividends, stockholders get more cash, need to pay tax at first, incur trading cost to reinvest the fund. On the other hand, if the management pays fewer dividends, the company incurs trading costs. The remaining shareholders receive less cash and pay less tax. The market value of their shares goes up because remaining stockholders share the future cash flows of the firm with fewer fellow stockholders. It is well-known that, n a rational and efficient market, before taxes, stockholders end up with the same amount wealth if dividends are paid or alternatively, if shares are repurchased.

But the question arises in case of under or over valuation of stock. Holding other factors constant, the managers of overvalued stock should favor cash dividends and should avoid stock repurchase arrangements and the managers of under valued stock should actively engage in repurchase programs. Management should time its repurchase. Factors model can be used to predict short-term return to the company's stock, e.g. a firm has just reported positive "earnings surprise". Management knows a few more good reports are on the way. But typically, the market has not caught on to this yet. The expected return on the company's stock is estimated to be high unusually high for the next year. So in this case repurchasing an unusually large amount of the company's stock in the current period is in management's interest.

4.1.4. Conclusions

Though new evidence is always welcome, we have to remember that:

".....a certain amount of caution and humility would appear to be appropriate in attempting to exploit the supposed inefficiencies considered here," (Shanken and Smith, 1996 p-101).

Finally, we can conclude that the strengths and weaknesses, make the theories acceptable but at the same time we need to be cautious about its applicability. Last, but not the least, it can be said that,

"It is ironic that abstract ideas developed in the 1950s and 1960s, which once were thought to have limited application, should become the common language of financial markets,"(Frank Milne,1995,p-11).

Section 2: Review of Literature Related to Stock Prices, Returns and Determinants

4.2.1. Introduction

It is well-known that the price is the best guide to know a market. So the factors, which in other words are remaining in the back door, determine the stock price is also important to have an understanding about the market. This section introduces the factors which determine the prices, which in turn determines the return, in the light of previous empirical studies in this particular field. The section will be organized attempting to highlight each of the variable affecting stock price one by one. Here to note that after reviewing the empirical studies of each variable, findings will be summarized in a table for each of the important variable.

4.2.2. Variables influencing the stock prices

There are a number of factors affecting stock prices and return, considered in finance literature. Several researches have been done to test their significance. Similar or different ideas come out form those researches that needed to be considered with caution and used them for further research. This is the major consideration of this section.

4.2.2.1. The impact of uncertainty/risk (beta) on stock prices

The expected future rate of return of an asset is the expected value of its future possible rates of return. Future is always uncertain, there is a possibility to increase or decrease of asset's return may be termed as risk.

Risk can be defined in many ways. By the term "risk" people usually come up with two notions:

i. uncertainty about the outcome and

ii. the possibility of what might be called a negative outcome.

So in short, risk should include a measure of variability and a measure of the possibility of negative outcomes. In terms of expected rate of returns and real rates of return, risk may defined as the deviation of actual returns from expected returns. In capital market research, uncertainty of assets return measurement termed as beta. Though beta measures the portion of risk which can not be diversified, it is particularly a linear measure of how many an individual assets contributes to the standard deviation of the market portfolio.

Theoretical background

The prediction of the Sharpe (1964), Linter (1965), and Black (1972), well known capital asset pricing model, (CAPM) or hereafter (SLB) model, states that there is a linear cross-sectional relation between expected return and betas. But over the past 10 to 15 years has provided evidence contradicting predictions, that the relation between risk and return is not always significant (FF1992).The deviations from the linear CAPM risk-return trade-off are related to, among other variables, firm size, (e.g. Banz 1981), earnings yield, (Bhandari, 1977, 1983), leverage (e.g., Bhandari, 1988) and the firm's book -value to equity ratio (Chan, Hamao, and Lakonishok, 1991). Kothari, Shanken and Sloan, (1995) based on the extensive research on the cross-sectional relation between risk and expected returns, after carefully reexamine the previous research, using annual returns in the estimation of beta, the return -beta relation over the post 1926 and post -1940periods, he presents the cross-sectional relations of average monthly returns on annual betas. In these regressions, portfolios are formed using a variety of aggregation procedure and choice of index (i.e., equally-or value-weighted), the coefficient on beta is economically significant and with few exceptions, the estimates are more than three standard errors above zero for the post-1940 as well as the post -1926 period. These findings are strong in all circumstances regardless of: full post-1927 period or 1941 to 1990 sub period analysis; the use of equally and value weighted index betas; the use of equally and value-weighted portfolios; and forming portfolios by ranking on beta or size alone, or independently ranking on beta and size, or ranking on beta then size or size then beta (FF1992).

In an intertemporal economy, where both risk (stock beta) and expected return change with time, Chan and Chen (1988) finds a linear relation between the unconditional betas and unconditional expected returns by imposing certain stationary assumptions about the stochastic process of size-portfolio betas. Their model suggests the use of long time periods to estimate the unconditional portfolio betas. The Author finds that, after controlling for the betas thus estimated, a firm-size proxy such as the logarithm of the firm size does not have explanatory power for the averaged returns across the size-ranked portfolios. They derive a linear relation between the unconditional betas and expected returns implied by the conditional single-factor pricing equation under some assumptions about the time-series process of the size-portfolios market betas (of which the constant market beta is a special case). Under these assumptions, a test of the pricing

equation is equivalent to a test of this linear relation and any other variable that is cross-sectionally correlated with returns (e.g. firm size) should not have marginal explanatory power on the returns after controlling for the unconditional betas. The Capital Asset Pricing Model (CAPM) can be generalized to describe the period-by-period risk-return relation in a multi- period equilibrium (e.g., Fama and Macbeth, 1973). The model predicts that an asset's conditional expected return (E_{it}) is linearly related to its conditional market risk (β_{it}), both being conditioned on the information available at t-1:

$$E_{it} = \lambda_{0t} + \lambda_{1t}\beta_{it}$$

In Sharpe (1964) and Linter (1965) model, $\lambda_0 = (r_f)$ the risk free rate of interest and λ_1= the expected market return over the risk-free rate. In Black's model (1972), λ_0 = the expected return of a zero-beta portfolio and λ_1= the expected market return over λ_0.

Summary table (beta) is given below:

Year of Study	Author	hypotheses	Model used	sample period	sample size	major findings
1988	Chan and Chen	H_0: A single-factor pricing model, any instrument variable that is a good instrument for expected return will be a good instrument for the beta.	Two step method used for analysis, in the first step, unconditional betas are estimated and in the second step generalized least square (GLS) is used for analysis.	1949-1983	Firms on the NYSE, having existence during the previous five years & also have price information on December of the previous years.	(1)There is a positive relation between unconditional betas and unconditional returns. (2) By using data from a longer period of time to estimate the betas, the explanatory power of the firm-size variable disappears.
1992	Narasimhan Jagadeesh	H_0: the size effect is not explained by beta.	Time-series regression model is used for empirical analysis.	1954---1989	Securities listed on the NYSE	(1) The relation between beta and expected return is not significant. (2) The relation between size and expected return is significant.
1992	Fama and French	The Joint roles of market beta, size, E/P, leverage, and book-to-market equity are significant for explaining the cross-section of average returns.	The cross-sectional (like Fama and Macbeth) regression model is used for analysis.	1963-1990	Non-financial firms from NYSE, AMEX and NASDAQ.	Their bottom -line results are:- (1) Beta does not seem to help explain the cross-section of average stock returns. (2)The combination of size and book to market

						equity seems to absorb the roles of leverage and E/P effect in average stock returns during 1963-1990 sample period.
1995	Fama and French	Their work is guided by two hypotheses are as follows:- (1)there must be common risk factors in returns associated with size and BE/ME , and (2) the size and book to market patterns in returns must be explained by the behavior of earnings.	Time series regression model is used for empirical analysis	1962-1992	All stocks from NYSE, AMEX and NASDAQ	They find that the market and size factor in earnings help to explain those in returns, but has no link between BE/ME factors in earnings and returns.
1995	Kothari, Shanken, and Sloan	(1) H_0: zero risk premium or the true coefficients is zero (FF, 1992) Whether there is compensation for beta risk. (2)H_0: There is a significant relation between B/M ratio and return.	They use time-series regression of annual portfolio returns to find out the relation between beta and expected return and the relation between book-to-market equity with the expected returns.	They use panel data to estimate beta: (1)panelA:1927-1990 (2)pane1B:1940-1990 For BE/ME sample period is 1947-1990	For beta estimate, any New York stock Exchange (NYSE),and American Stock Exchange(AMEX) firm with beta estimate available as of July 1 of a calendar year is included in the analysis. For BE/ME , they also use data from S&P industry book values of equity per share and price index from Standard and Poor's stock Price Guide.	(1)There is a positive relation between beta and expected return & the cross-section of expected returns reveals economically and statistically significant. (2)There is a weak relation between B/M and expected return and less consistent with FF (1992). (3)They also document a size effect in the cross-section of expected

						returns.
1973	Fama and Macbeth	The testable implications of the two parameter model for expected returns are hypothesized as follows:- (1) C1—The relationship between the expected return on a security and it's risk in any efficient portfolio m is linear (2) C2---βt is a complete measure of the risk of security i in the efficient portfolio m (3) C3-------In a market of risk-averse investors, higher risk should be associated with higher expected returns. (4) (S-L) Hypothesis-- E(~γ ot)= Rft Finally, capital market efficiency in a two parameter model requires ME(market efficiency)	They use cross-sectional regression model.	1926-6/68.	for all common stocks trade on the New York Stock Exchange	(1)The relationship between the expected return on a security and its risk in any efficient portfolio m is linear. (2)β is a complete measure of the risk of security i in the efficient portfoliom;(no-systematic effects of non-β risk) (3)In a market of risk-averse investors, higher risk should be associated with higher expected returns. (4)Finally, capital market efficiency in a two parameter is also sat isfied.
1981	Reinganum	H_0: estimated betas are not systematically related to average returns across securities.	1930-1979(monthly returns) 1964-1979(daily returns)	companies of the NYSE and AMEX (2000-2700 firms range)	They use different estimates of beta & also Hotelling's T2 procedure.	There is no relation with beta and expected return is their main findings.

4.2.2.2. The proxy variable size:

The size effect has attracted much attention from both in capital market research, as documented by Banz (1981) that the small firms earn higher returns than large firms. Chan and Chen (1988) propose that the size effect is an artifact of large measurement errors in betas that allow firm size to serve as a proxy for true beta. They report that when more accurate estimates of betas are employed, no size-related differences in average returns are observed. This explanation was also supported by Fama and French (1991) using size-based test portfolios as in Chan and Chen. However, Fama and French (1992) use test portfolios sorted based on both size and beta and find that the size effect is not explained by beta. Handa, Kothari and Walsey (1989) argue that size effect is sensitive to the return measurement intervals used for beta estimation and present results suggesting that it can be explained by betas with annual returns. Though different conclusions derived by several researchers we have to look on the main literature related to size.

Theoretical background:

The firm size effect was documented by Banz (1981) and Reinganum (1981) that small firms had higher average returns than large firms even after adjusting for risk via the capital asset pricing model (CAPM). Therefore, their result can be considered a rejection of the joint hypotheses that the CAPM is correct and that the market is efficient. In the empirical study of the Arbitrage Pricing Model (APT),[1]Chen (1981,1983) found that the firm size effect is essentially captured by the factor loadings of the APT. In his study portfolios of different size firms did not have significantly different average returns after adjusting for factor risks. Chen's result is consistent with the hypotheses that risk is the explanation for the firm size effect and that the market is efficient. To interpret the size effect, Chan, Chen and Hsieh (1985) use identifiable economic variables directly in a pricing equation in a multi-factor pricing equation. If the firm size effect persists, the time-series mean of the residuals from small firms will be higher than that from large firms. Two types of tests are performed with the residuals. The first is a univariate test-to observed if the estimated residuals from the two extreme firm size portfolios are statistically different.

[1]Ross(1976),Huberman(1982), and Cornor(1984) for the formal development;

They use a variant of Fama and Macbeth (1973) method to test the firm size effect. They first regress each of the 20 portfolios on the macro-variables in the first five years to estimate the variables' betas. Then they perform cross-sectional regressions of the 20 portfolio's returns on the obtained portfolio's multiple betas month-by-month in the sixth year for the twenty intervals. The cross-sectional regressions are computed using a generalized least square procedure. They also include BUSF (business information) as an explanatory variable.

They provide efficient estimates on only those premia most related to explaining the difference in returns for firms of different size. The residuals of the smallest two portfolios are positive and those of the largest three are negative. The Hotelling T^2's are not significant at the 5% level and the overall t statistic is 1.18. The higher average returns of smaller firms are compensations for higher risks, and the most significant risk here is the co-variation of portfolio returns with the risk premium. The inability of the market betas to capture these risks led them to analyze the size effect in a multi-factor framework, and they found that the resultant pricing model explained most of the size effect.

The empirical finding that a firm size proxy has explanatory power suggests that firm sizes are proxy for some unmeasured risks or risks that were not measured properly. Regressions with in MV, indeed results t statistics of the firm size coefficient is significant. In short, among the economic variables included, the measure of the changing risk premium explained a large portion of the size effect and the results are consistent with the fact that smaller firms are riskier than larger firms because they fluctuate more with economic expansions and contractions. They have explored the feasibility of a multi-factor pricing equation as an explanation of the firm size effect.

B. Banz, 1981, shows that market equity, ME (a stock's price multiplied by shares outstanding) an additional variable to explain the cross section of average returns provided by market beta. The explanations are such as average returns on small (low equity) stocks are too high given their beta estimates, and vice versa. The size effect is also documented as follows:

"*The foundations of current financial theory are being challenged by empirical research that suggests that corporate earnings and firm size data can be used to create portfolios*

that earn "abnormal returns". The reported "abnormal" returns range from just a few percent per year to almost forty percent". (Marc R.Reinganum, 1981, p-19).

Reinganum (1981) questioned the separate existence of both the size and EP effects. He found that both effects were present in equity returns if the two effects were considered separately but not when examined together.

"*After controlling returns for any E/P effect, a strong firm size effect still emerged. But, after controlling returns for any market value effect, a separate E/P effect was not found*". *(p.45)*

Keim(1983), based on the previous works, specially Brown, Kleidon and Marsh (1983) who report a reversal of the size anomaly for certain years and reject the null hypothesis of stationary year-to-year abnormal returns attributable to size, examines the month-to-month stability of the size anomaly over the period from 1963-1979. They use cross-sectional regression model to analyze the firm January effect is explained by the size effect (both OLS and WLS).

$$R_i = a_1 + a_2D_{2t} + a_3D_{3t} + \ldots\ldots + a_{12}D_{12t} + e_t$$

where, in the regression, R_i is the average daily CRSP excess return for day t for the size portfolio under considerations, and the dummy variables indicate the month of the year in which the excess return is observed (D_{2t} =February, D_{3t} =March, etc.)a_1, represent the excess return for January, while a_2 through a_{12} represent the differences between the excess return of January and the excess return of rest months.

Three interesting results emerge from their analysis are as follows:-

i. average return for smaller firms appear disproportionately large in January relative to the remaining eleven months. For example, the F statistic of 14.59 for the smallest firm portfolio is significant at any level and allows rejection of the null hypothesis.

ii. January abnormal returns for the larger firms' portfolios are negative and lower than the mean excess return in any other month. The large F-statistic of 17.63 for the largest firm portfolios also allows rejection of the hypothesis of temporal constancy of excess returns for large firms.

iii. for difference in averages excess returns between the smallest and largest market value portfolios indicates the observed size premium in January is positive and

significantly larger than the average premium in any other month. The F-statistic of 18.9 permits rejection of the hypothesis of a stable month to month size effect.

"Evidence *is provided that daily abnormal return distributions in January have larger means relative to the remaining eleven months, and that the relation between abnormal return and size is always negative and more pronounced in January than in any other month-even in years when, on average, large firms earn larger risk-adjusted returns than small firms*".

Summary table for size as a explanatory variable to stock return

Year of Study	Author	hypotheses	Model used	sample period	sample size	major findings
1985	Chan, Chen and Hsieh	(1)H_0: The risk premia are zero. (2)H_0: multifactor model is correct.	They use Fama and Macbeth's cross-sectional regression model	1953-1977	Firms on the New York Stock Exchange(NYSE)	Firm size anomaly is captured by a multi-factor pricing model. The higher average returns of smaller firms are justified by the additional risks borne in an efficient market.
1983	BROWN, KLEIDON and MARSH	H_0: There is a constant size effect.	They use a Seemingly Unrelated Regression Model (SURM) and generalized least squares (GLS) procedure to measure the size effect.	1967-1979	Primary sample was 566 firms and at last 496 firms exist until December 1979 from NYSE and AMEX.	(1)The relation betw excess returns and firm size effect can be regar as linear (the log of size (2)They document that the ex ante excess return regarded as size effect are not constant through time. (3)Their result also shown that different estimation methodologies can lead to different conclusion about the size effect.
1983	Donald B. Keim	H_0: Size effect is unable to explain the January effect.	He uses the cross-sectional regression (OLS&WLS) model for analysis	1963-1979	Firms from NYSE and AMEX ranges from 1500 in the mid-1960's and 2400 in the late	(1) There is a negative size effect in January.

					1970's	(2) In particular, about 50% of the average magnitude of the "size effect" over the period 1963-1979 is due to January abnormal returns.
1988	Chan and Chen	H_0: A single-factor pricing model, any instrument variable that is a good instrument for expected return will be a good instrument for the beta.	Two step method used for analysis, in the first step, unconditional betas are estimated and in the second step generalized least square (GLS) is used for analysis.	1949-1983	Firms on the NYSE, having existence during the previous five years & also have price information on December of the previous years.	By using data from a longer period of time to estimate the betas, the explanatory power of the firm-size variable disappear.
1992	Narasimhan Jagadeesh	H_0: the size effect is not explained by beta.	Time-series regression model is used for empirical analysis.	1954-1989	Securities listed on the NYSE	The relation between size and expected return is significant
1992	Fama and French	The Joint role of market beta, size, E/P, leverage, and book-to-market equity is significant for explaining the cross-section of average returns.	Cross-sectional regression model (like Fama and Macbeth's).	1963-1990	Non-financial firms from NYSE, AMEX and NASDAQ.	The combination of size and book to market equity seems to absorb the roles of leverage and E/P effect in average stock returns during 1963-1990 sample periods.
1981	Banz	Whether there is a relationship between the total market value of the common stock of a firm and	Time-series regression model	1926-1975	all common stocks quoted on the NYSE	The common stock of small firms had on average, higher risk-adjusted return than

		its return.				common stock of larger firms.
1995	Fama and French	Their work is guided by two hypotheses such as follows:- (1)there must be common risk factors in returns associated with size and BE/ME , and (2) the size and book to market patterns in returns must be explained by the behavior of earnings.	Time series regression model is used for empirical analysis	1962-1992	All stocks from NYSE, AMEX and NASDAQ	They find that the market and size factor in earnings help to explain those in returns, but has no link between BE/ME factors in earnings and returns.
1995	Kothari, Shanken, and Sloan	(1) H_0: zero risk premium or the true coefficients is zero (FF, 1992) Whether there is compensation for beta risk. (2)H_0: There is a significant relation between B/M ratio and return.	They use time-series regression of annual portfolio returns to find out the relation between beta and expected return and the relation between book-to-market equity with the expected returns.	They use panel data to estimate beta: (1)panelA:1927-1990 (2)pane1B:1940-1990 For BE/ME sample period is 1947-1990	For beta estimate, any New York stock Exchange (NYSE),and American Stock Exchange(AMEX) firm with beta estimate available as of July 1 of a calendar year is included in the analysis.	They also document a size effect in the cross-section of expected returns.

Evidence of an economically significant size effect is inconsistent with the CAPM predictions and this has led many researchers to reject the validity of CAPM as the main determinant of the cross-sectional variations in returns. However, the new factor models suggest that size can be expected to help explain the cross-sectional variation in stock returns. For these reasons, size will be considered an important variable in this proposed study, discussed in chapter 5.

4.2.2.3. Book value equity to market value equity ratio (BE/ME)

The variable BE/ME is an accounting based information variable. But it plays an important role in the prediction of stock returns. It is the ratio of book to market equity which indicates the extent to which the book value is greater or lesser than market value. It also signals the anticipated direction of stock returns.

Theoretical background

Stattman (1980) and Rosen Berg, Reid and Lanstein (1985) find that average returns on U.S stocks are positively related to the ratio of a firm's book value to common equity BE ,and to it's market value ME. Chan, Hamao and Lakonishok (1991) find that book-to market equity, BE/ME, also has a vital role in explaining the cross section of average returns on Japanese stocks. Fama and French (1993), confirm that portfolios constructed to mimic risk factors related to size and BE/ME add substantially to the variation in stock returns explained by a market portfolio. According to him, a three factors asset -pricing model that includes a market factor, and risk factors related to size and BE/ME seems to capture the cross-section of average returns on US stocks. Fama and French (1993) also confirmed and explained by a market portfolio that the risk factors associated with the variation of stock returns is related to size and book to market equity ratio. It is important to note that, the five factors seem to explain average returns on stocks and bonds. Fama and French (1993) argue that Book to Market Value (BV/MKT) ratio reflects the distressed position of the firm which deserved to be priced. If Book to Market Value ratio is greater than one (BV/MKT >1), indicates that the firm is in distress as compared to the firms with BV/MKT ratio less than one vice versa.

Penman (1991) finds a negative relation between BE/ME and returns, low book -to market equity firms remain more profitable than high BE/ME firms after 5years of portfolio

formation on BE/ME. Lakonishok, Shielfier, and Vishny (LSV, 1994) find that low book-to market -equity firms remain more profitable than high -BE/ME firms for at least, five years after portfolios are formed on BE/ME. Lakonishok,Shleifer and Vishny (LSV,1994) argue in favor of a hypothesis that the high average returns of high book-to-market stock simply for the correction of irrational pricing. i.e., low BE/ME stocks have low average returns because future earnings growth is weaker than market expected and on the other hand, high BE/ME stocks have high average returns because growth of earnings is stronger than expected .Although Fama and French (1995) findings in the later don't support LSV story. LSV (1994) find that value strategies (buying stocks that have low prices relative to earnings, dividends, book assets, or other measures of fundamental value) provide higher returns because these strategies exploit the sub-optimal behavior of the typical investor and not because these strategies are fundamentally riskier.

Fama and French (1995) under simple rational pricing models, find that BE/ME is related to persistent properties of earnings. High BE/ME (a low stock price relative to book value)signals sustained low earnings on book equity i.e., low BE/ME(a high stock price relative to book value) is typical of firms with high average returns on capital (growth stocks), whereas high BE/ME is typical of firms that are relatively price forecast the reversion of earnings growth.

Summary table of the related literature of the variable BE/ME to determine the stock price

Year of study	Name of author	Hypothesis	Theoretical model	Sample period	Sample size	Major findings	limitations
1993	Fama and French	H_0:-Different combinations of variables do not capture the common variation through time in the returns on bonds and stocks and the cross section of average returns.	They use time-series regression model for analysis.	1963-1991	4797 stocks from the NYSE,AMEX and (after1972) NASDAQ	There is a strong relation between Book to market equity and average stock returns.	Survivorship biases may be cause of strong relation between BE/ME and stock returns. Combination of bond returns lost it's 100% comparison with others.
1995	Fama and French	Their work is guided by the hypothesis such as follows:- (1)there must be common risk factors in returns associated with size and BE/ME , and (2) the size and book to market patterns in returns must be explained by the behavior of earnings.	Time series regression model is used for empirical analysis.	1962-1992	All stocks from NYSE, AMEX and NASDAQ	They find that the market and size factor in earnings help to explain those in returns, but has no link between BE/ME factors in earnings and returns.	There may be the problem of data snooping (Lo and Mackinlay,1990)
1992	Fama and French	The joint role of market beta, size, E/P, leverage, and book-to-market equity is significant for explaining the cross-section of average	The joint role of market beta, size, E/P, leverage, and book-to-market equity is significant	1963-1990	Non-financial firms from NYSE, AMEX and NASDAQ.	The combination of size and book to market equity seems to absorb the roles of leverage and E/P effect in average stock returns during 1963-1990	There may be problem of data snooping (Lo and Mackinlay,

		returns.	for explaining the cross-section of average returns.			sample periods.	
1995	Kothari, Shanken, and Sloan	H_0: There is a significant relationship between B/M ratio and return.	They use time-series regression of annual portfolio returns to find out the relation between book-to-market equity with the expected returns.	For BE/ME sample period is 1947-1990	For BE/ME , they also use data from S&P industry book values of equity per share and price index from Standard and Poor's stock Price Guide.	There is a weak relation between B/M and expected return and less consistent with FF (1992) returns.	The results may be for different data & methodology's using outcome.
1994	Lakonishok and Vishny	whether the value srategies are fundamentally riskier.	They use multiple regression model and also an extrapolation model for analysis.	April-1963-April-1990	The universe of stocks is the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX).	The cause of value strategies (buying stocks that have low prices relative to earnings, dividends, book assets, or other measures of fundamental value) provide higher returns because these strategies exploit the sub-optimal behavior of the typical investor and not because these strategies are fundamentally riskier.	(1)Survivorship bias may affect because the data are collected from COMPUSTAT tape. (2)Based on US data. (3)Their extrapolation model against the risk concern is not sufficient.

From the above studies it is remarkable that the BE/ME is an important variable to explain the stock returns may be included to test in a quite different data base and market.

4.2.2.4. Cash flow yield

It is also another accounting based information variable which may be considered as a complementary variable to earnings yield, measured as the ratio of cash flow divided by the market price. Their contribution in explaining the stock returns are discussed in the following theoretical background.

Theoretical background

Several studies evidence that earnings yields [Basu (1977) and Jaffe, Keim and Westerfield (1989), Cash flow yield, (Chan, Hamao and Lakonishok (1991)] and historical sales growth (Lakonishok, Shielfer and Vishny, 1993) to be related to subsequent returns. Also some evidence find January seasonal in the explanatory power of certain variables, e.g. Jaffe, Keim and Westerfield (1989) find evidence of seaonality in the explanatory power of the earnings yields and Fama and French (1992, p-448) report a January seasonal in the magnitude coefficient of the book to market equity.

Davis (1994) collected data from two primary sources. Book values, earnings, cashflow and sales figures from the *Moody's Industrial Manuals* that were published from 1940 to 1962. Stock returns, stock prices and market values of equity are taken from CRSP file of New York Stock Exchange (NYSE) and (AMEX after June 1962) firms. They used both Seemingly Unrelated Regression (SUR) model and also monthly cross-sectional regression model (Fama and Macbeth, 1973) to find out the explanatory power of the variables to the cross-sectional of realized returns. Their empirical results suggest that the book-to market equity has a significant explanatory power with respect to the subsequent stock returns in the cross-sectional regression. The earning yield and cash flow yield have also significant explanatory power. A two -way sort using cash flow yield and historical sales growth produce average return differences between extreme portfolios of more than 9.5 percent per year. They document that the coefficient of historical sales growth are negative and not so significant (Lakonishok, Shielfer and Vishny, 1993). The relationship between beta and returns are flat. In the multiple regression model, beta adds no explanatory power to such regression.

There is a January seasonal in the explanatory power of the several independent variables; much of the BE/ME, earnings yield, and cash flow yield effect are in January.

"*Assessing the marginal explanatory power of CF/P, E/P and LBM is difficult, because they are each a scaled version of price and thus highly correlated with one another. There is no clear winner among the three with respect to explaining the cross-sectional variation in stock returns*". *(Davis, 1994, p-1592).*

Summary table for the related literature of cash flow yield

Year of study	Name of the author	Hypothesis	Model	Sample period	Sample size	Major findings	Limitations
1994	Davis	H_0: certain variables (BE/ME, cash flow yield, earnings yield and sales growth) have no explanatory power for the cross-sectional regression with stock returns.	They use seemingly unrelated regression (SUR) as well as cross-sectional regression for analysis purposes.	1940 to 1962.	Book values, earnings, cash flow, and sales figures from the *Moody's Industrial Manuals* that were published from 1940 to 1962. Stock returns, stock prices, and market values of equity are taken from CRSP file of New York Stock Exchange (NYSE) and (AMEX after June 1962) firms.	The book-to market equity, earning yield and cash flow yield have significant explanatory power .A two -way sort using cash flow yield and historical sales growth produce an average return difference between extreme portfolios of more than 9.5 percent per year. They document that the coefficient of historical sales growth are negative .The relationship between beta and returns are flat . There is a January seasonal in the explanatory power of the several independent variables; much of theBE/ME, earnings yield, and cash flow yield.	The data collected from another source may be also suffered from such type of survivorship biases like COMPUSTAT tape.
1991	Chan, Hamao and Lakonishok	H_0: Ther is no significant relationship between the fundamental variables (E/P, C/P, BE/ME,Size) with the stock returns.	They use Seemingly Unrelated Regression (SUR) model as well as Fama and Macbeth (1973) cross-sectional regression model.	1971-1988	1570 companies from Tokyo Stock Exchange(TSE)	Overall, of the four variables, the book to market ratio and cash flow yield have the most significant impact on expected returns	(1) Developing a theoretical analysis of the relationship is beyond the scope of their study. (2)Their result do not cover all the Japanese Stock Market and the result also differ for one section to another in TSE.

Under consideration of the above studies it is documented that the variable like cash flow yield can explain the stock returns.

4.2.2.5. Earnings yield

Earnings of a company naturally determine the future prospects of an organization. So it is usual that the yield which reflects higher earnings causes higher stock prices.

Theoretical background

Banz, (1981) finds that stocks with lower market values outperformed the larger market values by a significant amount. Nicholson (1960) presented a long series of papers which provide evidence that higher earnings /price ratio or higher stocks provided higher risk-adjusted returns than lower E/P stocks. Peterson,(1974) showed that stocks with lower total book of assets provided higher risk-adjusted rate of returns than stocks with total invested capital.

Basu (1977) finds that during the period April 1957- March 1971, the low P/E portfolios seem to have, on average, earned higher absolute and risk-adjusted rate of return than the high P/E securities. This is also generally true when bias on the performance measures resulting from the effect of risk is taken into account. *These results suggest a violation in the joint hypothesis that (1) the asset pricing models employed have descriptive validity and (2) security price behavior is consistent with the efficient market hypothesis.* Basu (1983) shows that E/P help to explain the cross-section of average returns on US stocks in tests that also include size and market beta. Ball's (1978) argues that E/P is a catch -all proxy for unnamed factors in expected returns, whatever the unnamed sources of risk. All these variables can be regarded as different ways to scale stock prices, to extract the information in prices about risk and expected returns (Keim, 1988). Basu (1983) findings contradict with Reinganum's findings on the point that Basu argued that Reinganum's defective risk-adjusted returns concealed an EP effect that was indeed present in data and that the EP effect subsumed the size effect.

"This E/p effect, furthermore, is clearly significant even after experimental control was exercised over differences in firm size, i.e., after the effect of size, as measured by the market value of common stock, was randomized the high and low E/P groups. On the other hand, while the common stock of large NYSE firms, the size effect virtually disappears when returns are controlled for differences in risk and E/p ratios", (Basu,1983, p.26).

Summary table for the earnings yield as a determinant of stock prices

Year Of Study	Author	Hypotheses	Model	Sample Period	Sample Size	Major Findings	Limitations
1977	Basu	Whether the investment performance of common stocks is related to their P/E ratios.	They use OLS regression model for analysis.	April 1957-March 1971,	Over 1400 industrial firms trade on the NYSE between sep-1956-August 1971.	Basu finds that during the period the low P/E portfolios seems to have , on average, earned higher absolute and risk-adjusted rate of return than the high P/E securities	(1) the use of OLS suffers from heteroscadasticity (2) Violation of CAPM & efficient market hypotheses.
1983	Basu	(1)H_0: There is no earnings ' yield (effect on risk-adjusted rate of return. (2)H_0: no size effect on risk-adjusted rate of return.	They use univariate t test and Hotelling's Multivariate T^2 methodology	1962-1978	Firms listed on the NYSE and have traded at least the first month in the year.	This E/p effect, furthermore, is clearly significant even after experimental control was exercised over differences in firm size, i.e., after the effect of size, as measured by the market value of common stock, was randomized the high and low E/P groups. But evidence that the E/P effect subsumes the size effect.	Different data base and methodology may induce different results (when comparing with Reinganum & cook and Rozef).
1985	De Bondt and Richard Thaler	over-reaction hypotheses:- (1)whether extreme movements in stock prices will be followed by subsequent price movements in opposite	Their empirical results based on the residuals returns from : market adjusted, market model and SLB CAPM model.	Jan-1926-Dec-1982	Common stocks of New York Stock Exchange	Most of the investors over-react to dramatic news events supports over-reaction hypothesis. They also find January seasonal	The performance measurement criteria may differ from one to other.

		direction.(2) The more extreme the initial price movements, the greater will be the subsequent adjustment.					
1987	De Bondt and Richard Thaler	Whether the winner-loser anomaly can be explained by differences in CAPM betas.	OLS regression for analysis.	1926-1982	All stocks in the NYSE	The additional evidence reported that supports the over reaction hypothesis and inconsistent with the two alternative hypotheses based on firm size and differences in risk.. They document clear January effect.	There is no solution to the seasonality in the price correction regarding the winner-loser effect..
1989	Paul Zarowin	Whether the stock market overreact to extreme earnings	Regression of the return on an arbitrage portfolio against the market risk-premium	1971-1981	The CRSP monthly return file and the COMPUSTAT Annual Industrial file are the data base.	They document that size, and not investor over-reaction to earnings , is responsible for the "overreaction Phenomenon.	COMPUSTAT data base may cause survivorship bias.
1992	Chopra and Ritter	overreaction hypothesis	Time-series regression model	1926-1986	listed stocks on the New York Stock Exchange	The over reaction is substantially stronger for smaller firms than for large firms. Also observed for short windows around quarterly earnings announcement.	The size based explanation is not sufficient.

So from the above discussion we can conclude that the E/P as a powerful variable in explaining the variability in cross-sectional stock returns.

4.2.2.6. The impact of dividend on stock prices:

As mentioned earlier, dividend is a major component of stock returns, but precisely how far they affect stock prices is an ongoing debate in the finance literature. There are several studies concerning the issue. Miller-Modigliani (1961) proposed the "dividend irrelevance" theorem by assuming a perfect capital market. *"However, models based on the existence of market imperfections such as taxes and information asymmetries etc., suggest that dividends are relevant" (Allen and Rachim, 1996, p-175).*

In another theory the relevance is due to the agency cost developed by Jensen and Meckling (1976). Conceptually, the value of a share is determined by the cash flow it generates for its holder. The constant growth stock valuation model introduced by Gordon (1962) shows the relationship between dividend and stock prices as:

$P_0 = D_1/K_e - g$ [K_e is cost of equity, g is growth rate of dividend]

The equation shows that if the companies increases the payment ratios and thus increase D_1, the stock price will increase.

Theoretical background

The "bird in the hand" theory advocated by Gordon (1963) and Linter (1962) argued that the expected return on equity increases as the dividend payout is reduced because the investors can be surer of receiving dividend payments than the income from capital gains which are expected to result from retained earnings. They observe that investors regard actual dividend as being less risky than potential capital gains.

The tax differentiate theory, advanced by Litzenberger and Ramaswamy (1979) holds that the value of the firm will be maximized by a low dividend payout, because investors pay lower effective taxes on capital gains than on dividends. As a result, when the tax rate on dividend exceeds that on capital gains, investors should prefer reinvestment funds /earnings in order to maximize their after-tax return. Under signaling theory, management decision to increase dividend provides a credible signal to investors that the firm's management forecasts good future earnings (Ross, 1977). Thus price changes following

dividend announcement simply indicated that there is important information or signaling content in dividend announcement. The argument in favor of increasing payout ratio increases the stock prices (Graham and Dodd 1951).

On the other hand, Modigliani and Miller approach suggest that the existence of differential taxes on income and capital gains should make the corporations to pay low dividends more desirable, and thus a company can increase their share values by reducing its payout ratios.

Michaely, Thaler and Womack (1995) investigated the immediate and long-term effects of dividend initiation and omission announcements. They find that short- run price impact of dividend omissions is negative and dividend initiation is positive. Initiation reactions are about one-half the magnitude of the market reaction to omission announcements. The change in yield, however, is seven times higher for the omission announcements. They also show that the market reaction to a dividend omission announcement is not greater than to an initiation for a given change in yield.

However, it has evidence that dividend increases lead to stock price appreciation and dividend decreases to stock price decline (Charest 1980 and Aharony and Swary 1980). These provide managers the opportunity to benefit their shareholders.

Summary table of the literature dividend yield:

Name of the Author	Year of study	Hypothesis	Sample size	Sample period	Main Findings	Limitations
Allen and Rachim	1996	Whether there is an association between dividend yield and payout ratio with the stock price volatility controlling other variables.	1972-1985	173 Australian listed companies	There is no association between dividend yield & stock price volatility, But there is a negative correlation between stock price ratios controlling other variables.	#Based on Australian data base. #The rate of return effect is not supported with proper evidence.
Fehr , Benesh and Peterson	1988	Whether there is a relation between stock price reactions to announced dividend changes and the yields of the underlying securities.	1978-1984	1080 dividend paying (1015, increase, 65 decrease) firms of NYSE.	With a cross-sectional regression model, they found a significant positive relationship between announcement date returns and yield for dividend increase (decrease) even after controlling for the magnitude of the dividend change.	#They use cross-sectional regression model. Cross-sectional regressions are relatively blunt tools when used for an assessment of the implications of dividend policy.
Black and Scholes	1974	Whether expected returns on high yield common stocks differ from the expected returns on low yield common stocks either before or after taxes.	1936-1966	1050 NYSE firms	They find a positive relationship between excess risk-adjusted return and dividend yields (explain dividend yield proxied for an omitted variable in the two-parameter model).	His measures of dividend yield would substantially overstate the expected dividend if dividends were not sticky.
Litzenberger and Ramaswamy	1979	Whether there is a relationship between dividend yield and stock returns deriving the after tax version of the CAPM.	1936-1977	CRSP data base for NYSE stocks	Using pooled time-series and cross-sectional model, they find that there is a positive relationship between dividend yield and expected returns.	They do not deal with the information content of dividend.
Eric Liluan Chu	1997	Whether there is a relationship between stock returns and fundamental accounting information.	1990-1994	671 year-firms data.	Taiwan's stock returns are strongly associated with stock dividends and cash dividends are less important to the market.	Their result based on the specific characteristics of the market.

There has been considerable controversy concerning the effect of dividend yields on common stock returns. The controversy centers on whether or not the positive association between common stock returns and dividend yields reported in a number of empirical studies can be attributed entirely to information effects. Whether the effect of dividend yields on common stock returns can be attributed to takes or is due to some omitted variables remains an open question. The conclusion is that these significant yield effects cannot be attributed to the information content in the prior knowledge that the firm will declare a dividend of unknown magnitude.

4.2.2.7. The relation between retained earnings and common stock prices

The relation between stock price and retained earnings depends on the prospects of a firm and is a theoretical debate in finance literature. Generally there is negative relationship between the amount of retained earnings and stock price if there is no high potential future investment decision.

Oskar Harkavy (1953) provided evidence on the relation between retained earnings and common stock prices for large listed Corporations in US. He emphasizes both the distribution of earnings and retention in different view point of fiscal theorist and the securities analyst where fiscal theorist in favor of retention, on the other hand, financial analyst on the distribution of earnings. In considering the conflict, he encourages to examine the relation between retained earnings and stock prices. The study concluded that:

a. As of a given time, there is a tendency for stock prices to vary directly with the proportion of earnings distributed.
b. Over a period of years, the stocks of those corporations retaining the greater proportion of earnings tend to exhibit the greater price appreciation.

The first proposition may be termed as instantaneous effect, states that given two stocks similar in all respects except dividend payout ratio, stock with higher proportion of earnings in dividend, and a higher price will be paid for the stock. On the contrary, the second proposition states that those firms which are growing rapidly generally retain a substantial part of their profits to finance their expansion. Therefore, a higher proportion of earnings retained are associated with greater price appreciation. Their studies of individual

companies demonstrate that the mere fact of low dividend payout does not guarantee outstanding price appreciation. The bottom line result is that,

"*Increases in earnings power must accompany the increase in book value arising from undistributed profits if price appreciation is to be enjoyed*". *(p.297)*

Seltzer (1951) points out that "a rapidly expanding company can increase its earnings power with a given amount of plowed-back funds to a far greater extent that a firm which is declining or growing slowly (p-184)". According to Graham and Dodd, and acknowledged by Selzer, that a dollar of retained earnings may result in less than a dollar in price appreciation. There is statistical evidence that this is generally true when representative groups of stocks are considered. But for many growth companies, a dollar in retained earnings is associated with several dollars in price appreciation, and for declining firm's retention of earnings is concomitant of decreasing market value.

From the above theoretical basis we can conclude that the importance of retained earnings assuming the strength or future prospects is an important factor in determining the stock prices.

4.2.2.8. Nationality of the companies

The ownership pattern also has an important impact on stock prices. The ownership structure may vary across country to country. Shareholders of Multinational companies gains more when the firm's expansion is taking place in the foreign geographical location (Doukas and Travlos, 1988).The degree of multinationality of a firm is positively correlated with market value of the firm (Morck and Yeung, 1991).Usually it is seen that foreign ownership and Foreign sponsors involved companies doing better performance and higher firms value.

Theoretical background

There are some event studies concerning the effect of restrictions on foreign ownership (Swee-Sum Lam, 1997). He finds that imposing (relaxing) restrictions on foreign ownership reduces (increases) firm value. According to him, shareholder value may increase through the relaxation, or better still, the lifting of such restrictions; the corollary of his finding is that shareholders value may be decreased by the imposition or tightening of such restrictions. His preliminary evidence suggest that foreign ownership does enhance

Summary table for the related literature relating to the nationality of the company

Name of the Author	Year of Study	Model	Hypothesis	Sample period	Sample size	Major findings
Doukas and Travlos	1988	Cross-section linear model	Shareholders do not gain anything for foreign acquisition	1975-1983	All US firms engaged in international acquisition	Shareholders of MNCs gains more when the firms' expansion is taking place in the foreign geographical location.
Morck and Yeung	1991	cross-section linear model	There is no relation between multinationality and firm value	1978	1644 US firms	The degree of multinationality of a firm is positively correlated with market value of the firm.
Swee-Sum Lam	1997	pooled time-series and cross-sectional regression model	Whether there is a relation of imposing (relaxing) of foreign ownership restrictions on firm value.	July1991-Junne1994	14 companies.	He found that imposing (relaxing) restrictions on foreign ownership reduces (increases) firm value. According to him, shareholder value may increase through the relaxation, or better still, the lifting of such restrictions; the corollary of his finding is that shareholders value may be decreased by the imposition or tightening of such restrictions.

shareholders value for the large companies on the Stock Exchange of Singapore (SES) contrary to the findings Stulz and Wasserfallen (1995) show that it may be optimal to restrict foreign ownership . The influence of stock prices of a firm's ownership pattern and management body is an essential consideration for the determination of stock prices.

4.2.2.9. Stock price and trading volume

It is an old Wall Street adage that ***"It takes volume to make prices move"*** **(Karpoff, 1987, p-112).** *And* another familiar Wall Street adage is that ***"Volume is relatively heavy in bull markets and light in bear markets". (Karpoff, 1987, p-117).***

Academic treatment of a price-volume relation can be traced to Osborne (1959,) who attempted to model the stock price changes as a diffusion process with variance dependent on the number of transactions. This could imply a positive correlation between V and $\Delta|p|$, as later developed by Clark (1973), Tauchen and Pits (1983) and Harris (1983). However, by assuming transactions are uniformly distributed in time. Osborne was able to re-express the price process in terms of time intervals and did not directly address the volume-price issue.

Theoretical background

An early empirical examination of the price volume relation was conducted by Granger and Morgenstern (1963) using spectral analysis of weekly data from 1939-1961, could discern no relation between movements in a securities and exchange commission composite price index and the aggregate level of volume of on the New York Stock Exchange. In 1964, Godfrey,Granger, Morgenstern, presented new evidence from several data series, including daily and transaction data for individual data ,for individual stocks. But once again they find no correlation between prices of the absolute values of price differences and volume.

Another finding by Godfrey, Granger and Morgenstern is that daily volume correlates positively with the differences between the daily high and daily low. This is supported by a later finding (1970) that daily volume correlates with the squared difference between the daily open and close. They attributes this correlation to institutional factors such as stop-loss and buy -above market orders that increase volume "as the price diverges from it's current mean" (1964, p-20) Epps and Epps (1976), have suggested that volume moves

Summary table (volume)

Name of the author	Year of study	Hypothesis	Model	Sample size	Sample period	Major findings
Gallant , Rossi and Tauchen	1992	They investigate whether the joint dynamics of price changes and volume on the stock market exist.	They use a semi-nonparametric estimate of the density of current price changes and volume conditional on the past price changes and volume.	S&P composite price index and the daily volume of the shares trade on the NYSE.	1928-1987	They find that large price movements are followed by high volume and positive correlation between conditional volatility and volume.
Lakonishok and Smidt	1989	Whether there is a relation between past price changes and current trading volume conditional on the tax and non-tax related motives.	They use time-series regression model.	Companies listed on the NYSE and AMEX.	1971-1982.	The dynamic relation is negative for tax - related trading motives and positive for non- tax related motives
Smirlock and Starks	1988	Whether there is a relationship between absolute stock price changes and trading volume in the stock market.	They use Granger causality test.	300 firms from NYSE and S&P 500.	49 consecutive trading days from 15 June through 21 August1981.	There is a significant causal relationship between absolute price changes and volume at the firm level .
Jain and Joh	1988	There are no significant differences of average volume traded across trading hours of the day and days of the week.	They use Granger causality test	NYSE trading volume data and from S&P 500 index returns	1979-1983	Average volume trade shows significant differences across trading hours of the day and across days of the week.
Jonathon M.Karpoff	1987	no hypothesis, review previous research	A simple model of the price-volume relation is proposed.	No sample size	no sample period.	Two empirical relations are established: volume is positively related to the magnitude of price changes. and in equity markets price change per se.

In short, whatever the causes, it is usual that there is a positive relation between the trading volume and the price changes.

with measures of within -day price variability because the distribution of the transaction price change is a function of volume.

The failure of Godfrey et al. to uncover a price- volume relation motivated the others. Ying (1966) applied a series of chi-squared tests, analyses of variance, and cross-spectral methods to six-year, daily series of price and volume. Prices were measured by the Standard and poor's 500 composite indexes adjusted for dividend payouts, and volume by the proportion of outstanding NYSE shares traded. The findings are as follows: (a) a small volume is usually accompanied by a fall in price, (b) a large volume is usually accompanied by a rise in price and (c) a large increase in volume is usually accompanied by either a large rise in price or a large fall in price", (1966, p-676).

Summary table (volume)

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Lakonishok and Smidt	1989	Whether there is a relation between past price changes and current trading volume conditional on the tax and non-tax related motives.	They use time-series regression model.	Companies listed on the NYSE and AMEX.	1971-1982.	The dynamic relation is negative for tax - related trading motives and positive for non- tax related motives
Smirlock and Starks	1988	Whether there is a relationship between absolute stock price changes and trading volume in the stock market.	They use Granger causality test.	300 firms from NYSE and S&P 500.	49 consecutive trading days from 15 June through 21 August1981.	There is a significant causal relationship between absolute price changes and volume at the firm level .
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Jonathon M.Karpoff	1987	no hypothesis, review previous research	A simple model of the price-volume relation is proposed.	No sample size	no sample period.	Two empirical relations are established: volume is positively related to the magnitude of price changes. and in equity markets price change per se.

In short, whatever the causes, it is usual that there is a positive relation between the trading volume and the price changes.

4.2.2.10. The impact of industrial structure on stock prices:

As like as other market movement factors, industrial structure may have an impact upon stock return and prices. Industry specific indexes and the use of industrial production may improve the fit of the model (Roma and Schlitzer, 1996, p-515).

Richard Roll (1992) compared stock price indices across countries and attempt to explain why they exhibit separate behavior and found three differential behavior such as volatility of national Equity market differ; the inter correlation among market is surprisingly very low and macro economic variables explaining observed movements in equity prices.

Benjamin, F. King (1966) in his paper presents the evidence of market and industry factors effect on security price changes because a particular industry should be correlated with components of price changes affect the group of stocks falling that industrial classification only and where only one industry is represented , the industry factor is inseparable from the market effect. He examines the behavior of sixty-three securities from the NYSE, recording their monthly first differences in the logarithm of price over a total period of 403 months from June, 1927, through December, 1960. It has been shown in their factorial representation that the average proportion of variance due to industry effect is only about 10%, but the market effect accounts for about 50% of the variance.

Industrial structure can be considered as a variable because of different industrial structure in a market react differently to a specific variable.

4.2.2.11. The impact of corporate decision (leverage):

Leverage is sometimes referred to as a proxy for risk. It may be also termed an accounting based information variable, most frequently measured as the debt to equity ratio. The theoretical background of this variable is presented in the next sub-section.

Theoretical back ground

Bhandari, Laxmi Chand (1988) finds evidence that the expected common stock returns are positively related to the ratio of debt to equity, controlling for the beta and firm size and including as well as excluding January, though the relation is much larger in January. This relationship is not sensitive due to the variation in the market proxy, estimated technique, etc. The evidence also suggests that the premium associated with the debt/equity ratio is

not likely to be just some kind of risk premium. They test whether the expected common stock returns are positively related to D/E ratio controlling for beta and size.

Akhigbe, Easterwood, and Pettit (1997), find negative and significant price reactions for outstanding debt and equity when the issue is motivated by an unexpected cash flow shortfall. They find no evidence of a significant reaction for debt or equity for issues motivated by an unexpected increase in capital expenditures, an unexpected increase in leverage, or an expected refinancing of existing debt. They are able to document significant negative valuation effects for both debt and equity securities when public debt securities are issued to finance unexpected cash flow shortfalls., confirms the Miller and Rock (1985) model an asymmetric information model in which a firm's decision to raise external capital conveys information to the market that the current cash flow is lower than expected. Their model utilizes a sources and uses of funds constrain to define internally generated cash flows while assume symmetric information about the planned level of investments and dividend payments but asymmetric information about the firm's current cash flow. Leverage may be termed as a firm -level specific variable from its accounting based information and determine the effect on stock prices.

4.2.2.12. New stock issues and stock price movements:

An efficient capital market is not expected to exhibit a significant "new issue price effect" because of the assumptions of close substitutes and fixed investment policies which means that the price of any firm's shares should be independent of the number of shares issued, or whether any shareholders choose to sell their stock (Asquith and Mullins,1986, p.620). But this view of equity financing is not without challenge and these issues are discussed in the theoretical background.

Theoretical background

The empirical work has shown that there is an association between the announcement of stock issue with a drop in price, is found by Masulis and Korwar (1986), Asquith and Mullins (1986), Hess and Bhagat (1985) and Korwar (1983). Their explanation was such that when management acts for the interest of the current shareholders will not intend to issue new stock when it is known that the value of the firm existing assets is high. So a stock issue warns to the market that the firm's current assets are overvalued and drives down the share price. But their assumption was that (a) the firm has a single all-or-nothing investment opportunity whose cash requirements are fixed and known by all investors and (b) by allowing the firm to choose not merely whether to issue stock, but also how much stock to issue.

By elimination of the above assumption William S. Krasker (1986), generalized the Myers and Majful model. His findings concern the function relating the number of new shares issued by a firm to the resulting change in the firm's stock price, when insiders are asymmetrically informed. The results provided evidence that in equilibrium the stock price will be a decreasing function of the issue size and the rate of decrease can be so rapid to cause "equity rationing". There is also evidence of under investment relative to the asymmetric information case. This is explained by the reason that if asymmetric information is restricted to the value of the firm's assets, the smaller will be the value of the firm's assets in place, then there will be a greater investor uncertainty about the value of those assets, the smaller will be the expected return under investment, higher will be the stock price prior to the issue announcement.

The evidence is consistence with the findings of Masulis and Korwar (1986), that the stock price following the announcement of a stock issue should be inversely related to the issue size and the rate of decrease in the stock price and the rate of stock price increase can be so rapid that the product of the two-the total proceeds of the issue is bounded under these conditions -called "equity rationing" there is an upper limit to the amount of that the firm can raise by a stock issue, irrespective of how many shares management issues.

"***In an efficient capital market, securities can always be sold at a fair price; the net present value of selling securities is always zero, because the cash raised exactly balances the present value of the liability created. Thus, the decision rule is: take every positive -NPV project, regardless of whether internal or external funds are used to pay for it***". *(Myers and Majluf, 1984, p-187).*

This is irrelevant in an inefficient market with asymmetric information. There are also theoretical arguments for predicting a stock price decrease with equity issues. Mainly these are the effect of new equity issues on corporate capital structures and the role of stock issues as informative signals. The financing decision can affect share prices of a company where information is not symmetric is also an important issue in our consideration.

Summary table of the related literature (stock issue)

Name of the Author	Year Of Study	Hypothesis	Model	Sample Size	Sample Period	Major Findings
Asquith and Mullins	1986	They examine whether there is a relationship between the announcement day and issue day price effects of both primary and registered secondary issues of seasonal equity.	They use OLS regression model	531registered common stocks on the ASE and NYSE	1963-1981	Their result documents that the announcement of equity offering reduces the prices significantly.
Myers and Majluf	1984	#Management is assumed to know more about the firm's value than potential investors and investors interpret the firm's action rationally.	An equilibrium model of the issue-invest decision is developed under the assumptions.	No sample size	no sample period	The model suggests explanations for several aspects of corporate financing behavior, including the tendency to rely on internal sources of funds, and to protect debt to equity if external financing is required.
William S.Krasker	(1986),	Assumption of asymmetric information and by allowing the firms not only whether to issue stock but also how much stock to issue.	An equilibrium model of the issue-invest decision is developed under the assumptions	No sample size	no sample period	They find that the stock price following the announcement of a stock issue should be inversely related to the issue size and there will be under investment relative to complete information.
Akhigbe, Easterwood and Pettit	1997	Whether there is a significant price reaction related to debt or equity issue motivated by an unexpected cash short flow.	They use time-series model.	399 public US debt issues by firm with stock and debt outstanding.	1980-1992	They find negative and significant price reactions for outstanding debt and equity when the issue is motivated by an unexpected cash flow shortfall.

4.2.2.13. The impact of macro-economic variables on stock prices:

"Participants in the financial markets are eager observers of numerous economic figures and according to market commentators, asset prices regularly react to fluctuations in macro-economic variables" *(Asprem, 1989, p-589).*

Though there is no generally accepted asset pricing model that explicitly takes economic variables into account. But the theoretical issues evidence a significant relationship of asset prices with the macro-economic variables may be explained in a complicated way that will be discussed in the theoretical issues.

Asprem (1989) find significant but small explanatory power in ten European countries from such macroeconomics variables as employment, imports, and interest rate. Much more of the variability in equity returns is explained by a broad market index constructed from returns averaged across all countries and find a significant strong relationship in Germany, the Netherlands, Switzerland and the United Kingdom.

Tony Caporale and Chulho jung (1997) provided a time series measure of expectations is used to demonstrate the existence of an inverse relationship between inflation and real stock prices, even after controlling for output shocks. The empirical finding that real stock returns are inversely related to inflation rates has a significant debate in the finance literature. Modigliani and Cohn (1979) attribute the real effects of inflation to the existence of collective money illusion. Feldstein (1980) argues that inflation lowers stock prices because non-neutralizes in the tax treatment of inventory and depreciation charges cause inflation to lower real after-tax profit. Fama (1981) argues that the negative inflation-stock return relationship is generated by a positive causal link between real output and stock returns coupled with an inverse correlation between real output and inflation. According to Fama, the statistical relationship between inflation and stock returns should disappear once the effect of real output growth is controlled for .Using survey data to measure expectations, Coate and Vanderhoff (1986), present empirical evidence in support of Fama's view. They found that both anticipated and unanticipated inflation were insignificant in a stock return regression that included actual and surprise output growth.

A negative relationship between stock market returns and inflationary trends has been widely documented for developed economics in Europe and North America. Arjun Chatrath, Sanjay Ramchander and Frang Song (1997) studies provides similar results for India with a sample from BSE (Bombay Stock Exchange) during the 1989-1992 periods. They investigate the relationship in light of Fama's (1981) proxy hypothesis that centers on linkages between inflation and real activity and stock returns and real activity. Specially, the study tests whether there is a negative relationship between inflation and real economic activity, and a positive relationship between real activity and stock returns. The results from the heteroscedasticity and auto correlation corrected OLS model provides some support for Fama's contentions, i.e. (a) a negative relationship between inflation and real activity is documented and (b) the relationship between real activity and stock returns is found to be positive. However, the negative association between real stock returns and unexpected component of inflation (and inflation perse) is found to persist, despite a two-step estimation that controls for the inflation and real state activity relationship.

The practical implication of these findings is that negative correlation's between stock returns and inflation observed for post war period may not be reliable for the purpose of prediction. The causes of stock price movements explained by Roll (1988) based on individual stock and Eugune Fama (1990) use a similar methodology to aggregate stock price movements. He finds that 2/3 of the variance of aggregate stock price movements can be explained by variables like corporate cash flows and investors discount rate. Roll (1988) finds that less than 40 percent of the variance of stock price typically explained by allowing informal extra information market participants has about future macro economic development.

From the above studies, we can identify the various macro-economic variables (monetary & fiscal policies and other real variables) and their impact on stock prices. We can also use the lagged & lead variables to test the weak form efficiency of the market.

4.2.2.14. The impact of announcement effect (signaling) on stock prices:

"***Efficient markets theory explains that a stock price in any period t is a function of all relevant information known in period t. Changes in stock prices between periods t and t+1 must therefore be due to new information hitting the market. The rational***

expectations hypothesis postulates that an unbiased expectation of a variable is formed on the basis of all available information. Therefore, according to both efficient market and expectation theory only surprise information should cause changes in stock price". *[Tony caporale and Chulho Jung, 1997, p-265]*

The impact of announcement effect may be the evidence for or against market efficiency. There are different types of announcement effects on different stock prices. Mark L. Mitchell and J. Harold Mulherin (1994) address the question of the impact of public information on the stock market, whether the amount of information that is publicly reported effects the trading activity and the price movements in securities markets. The primary contribution of their research design to this important issue is that they use a distinctive proxy for information, i.e. the number of announcements released daily by Dow Jones and company. According to them, although that proxy certainly yields an imperfect treatment of the information available to securities market participants, it is more comprehensive than most measures used in prior studies and provide a reasonably broad, observable variable with which to address the question of the impact of public information on the stock market. According to researchers,

"***Measures of market activity including trading volume, price changes and return volatility evidence systematic patterns by hour, day and other seasonal frequencies. These patterns are quite pervasive, occurring in equity, futures and other financial markets and are often labeled anomalies because of their apparent inconsistency with financial theory. The extent to which market regularities are in fact anomalous depends, of course, on the behavior of the information that influences financial markets***".

The relation between news and market activity is also robust to the inclusion of non information sources of market activity as measured by dividend capture and triple-witching trading. At the same time, aggregate market volume is positively and significantly related to both dividend-capture trading and a dummy variable for triple-witching days, indicating in a sample fashion why volume and information are not perfectly correlated. By contrast, the measures of market and firm-specific returns are not significantly related to the non information sources of trading activity.

While they find direct, strong relation between Dow Jones news stories and stock market activity, the observed relation is as weak as that reported in prior research. Because of the

comprehensive nature of the Dow Jones database, the results give credible confirmation as to the difficulty of linking volume and volatility to observed measures of information. The combined evidence suggests the complexity of the relation between public information and the stock market.

In a well-functioning market, on average, there should be no surprise in dividend announcement. Absent microstructure effects, market efficiency dictates that the excess returns to all dividend announcements, taken together be zero. However, Kalay and Loewenstein (1985) find that during three-day period surrounding dividend announcements, the actual returns on average significantly exceed both the returns predicted by the markets model and the average daily returns realized over a recent period. They also find that the market reaction to dividend announcement is sluggish, i.e. the excess return persists for up to four trading days after the announcement date. In a subsequent study, Eades, Hess and Kim (1985) find that for the sub-sample of dividend announcements that are separated sufficiently from ex-dividend dates, there is no evidence of sluggishness. They also confirm that the market reactions to dividend announcement are biased. Mukesh Bajaj and Anand M.Vijh, 1995, find that the average excess return to all dividend announcements increase as the firm size and stock price decrease. On the basis of 67,592 dividend announcements (including 336 dividend omission announcements) by the NYSE-listed firms over the period July 1962 to June 1987, they find a 0.21% average excess return over the three day announcement period. For the lowest decile of firm size (stock price), the average excess return is 0.67 (0.16%) while the corresponding average for the highest decile of firm size (stock price) is 0.07 (0.05%).

Their findings on the form size and stock price effects suggest that the observed price reactions may be due to micro-structure based reasons. Market micro-structure can affect stock prices during dividend announcement periods for two reasons:-spill-over of tax - related trading around ex-dividend days and trading behavior related to the dissemination of dividend information.

Using transactions data, they examine trade and quote prices to study microstructure effects during dividend announcements. First, they investigate whether the observed returns are biased upward due to the bid-ask spread. Such a bias may arise if the closing price before an announcement is more likely to be a bid price or the closing price after an

announcement is more likely to be an ask price. The results of them find no such evidence. Second, they look for evidence of price pressure due to concentration of buy orders after dividend announcements. Even though the total trading volume increase significantly, the relative numbers of buy and sell orders after an announcement are similar to those on an unaffected day. Their finding that there is increased trading volume but no "buying pressure "during a dividend announcement period suggests that the increased trading activity may be related to information production rather than tax arbitrage.

Stock splits should have no effect on firm value in perfect capital markets, yet stock prices increases on spilt announcements. The two traditional explanations are information signaling and improved liquidity for shares that trade at lower prices. Muscarella and Vetsuypens (1996) investigate these explanations by studying splits of Americans Depository Receipts (ADPs) that are not associated with splits in their home country stock and which represent unique illustrations of the effect of liquidity. They interpret their findings as supportive of the liquidity explanation of stock split announcement effect.

Stock splits are cosmetic transactions that should neither create nor destroy value. Yet significant stock price increases around split announcements (and split execution) are well documented. Academic research generally interprets the positive stock market reaction to split announcements as a response to managers signaling favorable inside information [Brennan and Copeland (1988), McNichols and Dravid (1990), Brennan and Hugher (1991)]. In contrast, practitioners state the splits restore stock prices to a lower, more suitable trading range, which is said to improve liquidity (Baker and Gallagher 1980; Baker and Powell 1993).

We can examine the announcement effect on stock prices in terms of event studies and show how long it takes to adjust stock prices will prove the semi-strong form efficiency of the market.

4.2.2.15. The relation between aggregate insider transactions and stock market returns:

A number of studies examine insider transactions prior to corporate events (e.g. new issue announcements, Karpoff and Lee (1991) and dividend announcements, John and Lang

(1991) presumably motivated by regulation of insider trading is based on this assumption, as noted by Lorie and Nieder hoffer (1968, p.35), "***The interest of the SEC in trading by insiders stems in part from the belief that insiders should not exploit their special opportunities to know about developments in their companies***".

Mustafa chowdhury, John S.Howe and Ji-chailin (1992) use a VAR model to examine the relation between aggregate insider transactions and stock market returns. Consistent with the previous literature, there is some predictive content associated with aggregate insider transaction, but its magnitude is slight in contrast, market returns have substantial influence on the aggregate purchase and sales of corporate insiders. Their findings suggest that (a) the degree of mispricing observed by insiders is small (b) very little of the mispricing is associated with unanticipated macroeconomic factors and (c) investors cannot use aggregate insider transactions to profitably predict future market returns over the following eight weeks.

Seyhun (1986) investigates the anomalous findings of insider trading studies that any investors can earn abnormal profits by reading the official summary. He examines the availability of abnormal profits after the cost of trading and the outsiders after public information by using approximately 60,000 insider sale and purchase transactions from 1975-1981. He finds no abnormal profit of outsiders following public announcement support market efficiency.

Insider transactions by insiders (private information) making abnormal profit is against the validity of strong-form efficiency. It may be taken under consideration in our studies to prove the efficiency of the market.

4.2.2.16. Seasonal effect on stock prices:

Seasonal effect may be termed as abnormal profit earn in a particular period, for instance, during January, holiday, weekend etc. Market efficiency does not support seasonal effect. But in practical case, researchers find seasonal effect may be termed as a determinant of stock prices, though it may vary across countries and economy.

Robert A. Ariel (1990) find evidence of high mean returns (nine to fourteen times) prior to Holidays than the remaining days of the year. Examination of hourly pre- holiday stock returns reveals high returns throughout the day. Pre-holidays stock returns in the post -test

(1983-1986) are also examined. Fields (1934) examines the frequency of DOW JONES industrial average advances on days surrounding the 1901-1932 finds a disproportionate frequency of increases on trading days preceding long holiday's weekends.

Lakonishok and Maberly (1990) provide evidence related to weekend effects that trading patterns of individual institutional investors related to the day of the week. They find a relative increase in trading activity by individuals on Monday (opening day after week-end). They explain the week end effect partially on the basis of a tendency for individuals to increase the number of sale transactions relative to buy transaction.

Ritter (1988) proposed that January effect is caused by buying and selling behavior of individuals and affected by calendar year. About weekend effect his opinion is that this does not reveals cause and effect relations between trading and price changes. But the selling pressure on Monday may cause drop in prices. Ritter's (1988) and Haris and Gurel's (1986) demonstrate that stock seasonal can be induced by specific clienteles' investment decisions suggests the possibility that there may exist in this case as well some clientele prefer buys(or avoids selling) on pre-holidays. There are some evidence of abnormal returns in January are noted by Keim (1983) and Brown, Kleidon and Marsh (1983) explaining the size effect.

Osborne (1962) predicts a pattern of market participants' activities. He predicts that because of individual investors have more time to take financial decision during the week-end, they are more active in the market on Monday. Osborne also predicts that the potential causes of institutional investors are less active on Monday tends to be a day of strategic planning.

Intra day studies provided evidence by Smirlock and Starks (1986) and Harris (1986) that the bulk of Monday's decline seems to occur between Friday's closing and Monday's opening. Information about Monday's trading activity of individual and institutional investors at the open and during the day could help in providing insights in explaining the day could help in providing insights in explaining the weekend effect. There are some seasonal effects specially January effect reported in the previous sub-sections. Roll (1983a) finds high returns accruing to small firms on the trading day prior to New Year's day.

Lakonishok and Smidt (1984) note that prices also rise in all deciles (of market capitalization) on the last trading day before Christmas and conclude that the high Christmas returns of large companies might be considered (another)...mystery. Merill (1966) finds that a disproportionate frequency of DJIA advances on days preceding holidays during the 1897 to1965 period and Fosback (1976) noted high pre holidays returns in S& P 500 index returns.

All the evidence concerning seasonal effect may be explained in terms of market inefficiency. The seasonal effect may vary according to the special circumstances. In Bangladesh perspective the period after budget announcement and political movement may be taken under consideration in addition to the seasonal effect discussed earlier.

4.2.3. Summary and conclusion

There is a substantial body of literature on security pricing and theories explaining market behavior in the Western market economies. There is also some evidence from Asian markets like, Japan and Taiwan that can also be categorized as developed economies. The above factors can applied in an inefficient market like Dhaka Stock Exchange. However, only researches have been carried out on the developing countries in general and no studies on Bangladesh in particular, where an emerging market in an underdeveloped or may be so far classified as a developing. The proposed study will overcome the shortcomings of applicability, considering major factors instead of one or few variables. The study will also consider the model combining the effect of both time and individual companies influence in an inefficient market.

Section III: Review of Theoretical and Empirical Research on Stock Market Volatility

4.3.1. Introduction

Volatility has been considered to be one of the most important topics of empirical finance literature. Lots of empirical studies are conducted since 1930s. These studies covered markets all over the world including markets from developing and developed countries. Nature of volatility of different markets in different times are discovered which are indeed of great interest for financial economists. Financial economists are also interested about the causes and variables behind the existence and nature of as well as the anomalies relating to market volatility.

From the beginning to the last study, attempts are taken to explain the exceptions of general nature of volatility, to evaluate performances of different models that can explain the appropriate nature of volatility so that future volatility can be predicted, to highlight features of volatility, to find out the effect and the association with other variables, etc. Findings of these studies have an ongoing trend, which is compiled in this review to give an overall picture on this important area of financial economics. Data sets and methodologies used in this area of study are also highlighted in this review.

4.3.2. Review of earlier literature:

4.3.2.1. 20th Century:

4.3.2.1 (a) 1930s:

1934: Graham & Dodd provided the basis for the 'bird in hand fallacy' implying that the return on high-yield stock is more than on the low-yield stocks.

4.3.2.1 (b) 1950s:

Lintner (1956) recognized the existence of dividend announcement effect on stock prices. Gordon (1959) tested the hypothesis that the dividend multiplier is several times greater than the retained earnings multiplier.

4.3.2.1 (c) 1960s:

Miller & Modigliani (1961) demonstrated that in a perfect capital market, dividends are irrelevant to the market value of the firm. In response to recognition of dividend announcement effect on stock prices they stated that were likely to and have a good reason

to interpret a change in the dividend rate as a change in management views of future profit prospect for the firm. Gordon (1963) suggested that paying larger dividends (which in an imperfect market might lead to lower investment), could reduce risk, which could then influence cost of capital, and hence the stock price. Granger & Morgenstern (1963); Fama (1965) gave the random walk hypothesis that returns are unpredictable and that stock prices follow a random walk or martingale process. Godfrey *et al.* (1964) showed that return variance is higher on Mondays for US. Information that accumulates when financial markets are closed is reflected in prices after the market reopens. Friend & Puckett (1964) indicated that higher dividend payout is usually negatively associated with higher P/E ratios. Suggested that there was little basis for the traditional view that the impact of a dollar of dividends is several times greater than the impact of retained earnings. Fama (1965) showed that return variance is higher on Mondays for US. Information that accumulates when financial markets are closed is reflected in prices after the market reopens. Ying (1966) presented that a large increase in volume of trade is usually associated with a large rise or fall in price.

4.3.2.1 (d) 1970s:

Beaver, Kettler & Scholes (1970) analyzed the extent to which accounting risk measures are impounded in the market risk measure. Levy (1971) using weekly return rates for 500 NYSE stocks concluded that beta was not stable for individual stocks over short period of time. Blume (1971) noted that beta was significantly more stable in portfolios consisting of a large number of stocks. Clark (1973); Epps & Epps (1976) introduced an important new model, the "mixture of distributions" hypothesis concentrating on the distribution of speculative prices which it assumes to be kurtotic and links information flow, volume and price variability. He also presented the intuitively appealing Mixture of Distributions Hypothesis (MDH). The MDH posits that stock returns and trading volumes are jointly dependent on the same underlying, latent information flow variable. Officer (1973) examined the effects of volatility in business cycle variables as the cause of stock market volatility. Black & Scholes (1974) suggested that it is not possible to demonstrate that the expected returns on high-yield common stocks differ from the expected return from low-yield common stocks either before or after taxes. Ben-Zion & Shalit (1975) investigated a firm's characteristics: size, leverage and dividend record, as a determinant of equity risk.

The results suggested that firm's risk was positively related to leverage and negatively related to size and dividend record. Silber (1975) found two salient characteristics of thinness, (i) large bid-ask spread and (ii) large variability in price per unit of excess demand. He examined five variables against price change volatility, (a) volume trade of each security, (b) total supply outstanding of the security, (c) number of stockholders, (d) total asset of the firm, and (e) number of days when no trading of the security occurred. His result shows that volume of trade is the best indicator of lack of thinness. Copeland (1976); Epps & Epps (1976); Akgiray (1989) argued that the non-stationarity of variance in common stock returns is a function of the information arrival to the market. Morgan (1976) not only found the stock return distribution to be heteroscedastic, but also found that trading volume can play an important role in explaining the variance of return distribution. Black (1976) suggested that as stock prices fall, the weight attached to debt in the capital structure increases which will lead equity holders to anticipate higher expected future returns volatility. Data on individual stock returns satisfied this suggestion. Black (1976) reported evidence that suggested that a negative shock to stock returns will generate more volatility than a positive shock of equal magnitude. Jensen & Meckling (1976) agency costs are the reason why dividend policy is relevant as they developed. Sharpe & Sosin (1976) reported that high dividend yield was related to low beta and provided a lower average excess return whilst low dividend yield was related to high beta and provided a higher average excess return. Scholes & Williams (1976, 1977) existence of a true price even when the market is closed or when there is no trade in open market. Thus return is generated over weekends or evenings when trade is closed & in thin markets when assets are not being traded. These models assume price change as independent of when and how trade occurs.

Shleifer & Vishny (1997) explained the deviation of the market and fundamental values including limits of arbitrage. Fama & Schwert (1977) assessed the ability of expected return changes to explain return variation. Basu (1977) showed that Earnings/Price ratio is positively related to expected return. Brown, Finn & Hancock (1977) noted that dividend and profit reports are normally announced simultaneously and that the impact on share price is immediate. They showed that movements of share price are positively related to both dividends and profits. Rogalski (1978) focused on basic tests of casualty between the

variables. Cohen *et al.*(1978) showed that variance is inversely related to market value of stock under heterogeneous expectations. If total market value is the inverse proxy of thinness, thinness is significant determinant of variance. Bhattacharya (1979) emphasized that dividend policy can be used as a signaling mechanism. They also reported the existence of the negative relationship between market risk, beta, and dividend yield, which further implied that higher risk firms had higher retention ratios. Scholes & Williams described the existence of a true price even when the market is closed or when there is no trade in open market. Thus return is generated over weekends or evenings when trade is closed & in thin markets when assets are not being traded. These models assume price change as independent of when and how trade occurs. According to Marshall (1974); Robinson (1975) price can be changed without trading as investors expectations change in unison. Cohen *et al.* (1978) showed that variance is inversely related to market value of stock under heterogeneous expectations. Silber (1975) found two salient characteristics of thinness, (i) large bid-ask spread and (ii) large variability in price per unit of excess demand. He examined five variables against price change volatility, (a) volume trade of each security, (b) total supply outstanding of the security, (c) number of stockholders, (d) total asset of the firm, and (e) number of days when no trading of the security occurred. His result shows that volume of trade is the best indicator of lack of thinness. Blume (1971) noted that β was significantly more stable in portfolios consisting of a large number of stocks. Baesel (1974) noted that in general, the stability of β s increased as the length of the estimation period extended.

4.3.2.1 (e) 1980s:

Reilly & Wright (1988) made an important observation that the β was sensitive not only to the length of the estimation period but also to the relative size of the firm. Karpoff (1987) argued that price changes are related to traded volume and that the relationship provides not only insight into the structure of financial markets but also has implications with respect to discrimination between the stable Partisan and the mixture of distributions explanations of the observed distributional characteristics of speculative prices.

Ross (1989) assumes that information arrives through a Martingale process. In no arbitrage condition return variance is directly related to the flow of information.

Transaction arrivals are also likely related to this. Non-trading periods are no-information periods and price & return do not change during this type of period. French & Roll (1986) found that prices are more volatile when market is open than when closed. This result suggests that return has a component driven by information arrival. To explain more variance on trading days they tested several hypothesis and got following results. (a) 4% to 12% of daily variance is driven by 'noise trading'. (b) Rest of the daily variance can be explained by difference in flow of information (mostly private) during trading & non-trading hours. French (1980) tested two alternative models "Calendar Time Model" (stating that return are continuously generated in calendar time) & "Alternative Trading Time Model" (stating that return are only generated during active trading). He found neither model to support US data.

De Angelo & Masulis (1980) hypothesized that a tax clientele effect would greatly reduce aggregate tax costs. Blume (1980) measured dividend yields as the ratio of the dividend paid over the previous 12 months to the price at the beginning of those 12 months and argued that the Black & Scholes measures of dividend yield would substantially overstate the expected dividend if dividends were not sticky. Revealed a positive and significant relation between the quarterly realized rate of returns and both beta coefficients and the anticipated quarterly dividend yields. Jennings, Starks & Fellingham (1981) developed the sequential information hypothesis, which assumes that information is received by each participant ('optimists' or 'pessimists') one at a time, who in turn adjusts their demand curve accordingly. Banz (1981) documented the size effect and found a negative statistical association between return and size of approximately the same magnitude as that between return and beta. Gibbons & Hess (1981) showed that return variance is higher on Mondays for US. Information that accumulates when financial markets are closed is reflected in prices after the market reopens.

Engle (1982) gave the autoregressive conditional heteroscedasticity (ARCH) process which is shown to possess better explanatory power than the simple least squares technique of unconditional estimators. Cristie (1982) reported evidence that suggested that a negative shock to stock returns will generate more volatility than a positive shock of equal magnitude. Blanchard & Watson (1982) explained the deviation of the market and fundamental values including speculative bubbles. Christie (1982) made relationship of

stock market volatility to financial leverage. Hess (1982) suggested that information did not explain the dividend effect. Brickley (1982) suggested that whilst his studies were consistent with an information signaling hypothesis, no direct evidence existed that management consciously used financial decisions for signaling the firm's outlook. Gultekin & Gultekin (1983) found statistically significant stock market seasonality in 14 out of 17 countries studied. Tauchen & Pitts (1983) said that when new information arrives, market agents revise their asset valuation accordingly: if there were broad agreement about the implications for asset values of these new information, subsequent price adjustment would occur with a relatively small amount of trading; however, the greater the difference of opinion among investors, the greater the volume of trading. Brown, Kleidon & Marsh (1983) found that the size effect reverses itself for sustained period. Keim (1983) found that the size effect is concentrated in January. Roll (1983) supported the size effect being concentrated in January when he found that abnormally large returns for small firms are obtainable on the last trading day in December. Shiller (1984) explained the deviation of the market and fundamental values including fads. Easterbrook (1984) gave the view that dividend payments reduce the agency costs of free cash flow. That is, the payment of dividends to shareholders motivates managers to disgorge the cash rather than investing it at below the cost of capital or wasting it on organization inefficiency. Keim & Stambaugh (1984) found that the size effect becomes more pronounced as the week progresses and is most pronounced on Friday. Rozeff (1984) showed that dividend yield (D/P) forecasts short-horizon stock returns. Keim & Stambaugh (1984) claimed the anomalous empirical findings that the average return on Friday is abnormally high and that of Monday is abnormally low- is one of the most puzzling phenomenons in Finance. They called high Friday return and low Monday return as the 'day of the week' effect and the 'weekend (Monday) effect'.

Miller & Rock (1985) suggested that the dividend announcement provides the missing pieces of the sources/ uses constraint and allows the market to estimate the firm's current earnings. Miller & Rock (1985) developed a model in asymmetric information framework, suggests that a dividend announcement provides the missing pieces of information about the sources/uses of funds constraint and allows the market to estimate the firm's current earnings. The implication is that the dividend announcement affects expected earnings.

French & Roll (1986) considered the arrival of information as constant over trading and non-trading periods. They found that prices are more volatile when market is open than when closed. This result suggests that return has a component driven by information arrival. To explain more variance on trading days they tested several hypotheses and got following results: (a) 4% to 12% of daily variance is driven by 'noise trading'. (b) rest of the daily variance can be explained by difference in flow of information (mostly private) during trading & non-trading hours. Black & Summers (1986) argued to the arbitrage realization effect built on the assumption of financial market be materially inefficient. Harris (1987) largely confirmed the predictions of that Mixture of Distributions Hypothesis by their empirical studies. French *et al.* (1987) made relationship of stock market volatility to the volatility of expected returns. French *et al.* (1987) analyzed daily S&P stock index data for 1928 – 1984 and reported conditional volatility in returns.

Roll (1988) found that only approximately one third of the monthly variation in individual stock return can be explained by systematic economic influences. Concluding that linking major market moves with release of economic or other information is difficult. Fama & French (1988a) reported impressive findings that US stock prices contain a slowly decaying temporary (or mean-reverting) component producing the result that between 25 and the 45% of the variation of 3 to 5 year US stock returns appears to be predictable from past returns. Cochrane (1988) first employed the variance-ratio test, compared the relative variability of returns over different horizons. Poterba & Summers (1988) found that returns for 18 countries in their study are mean reverting for 3-8 year return horizons. Findings are robust to the sample choice. Neal (1988) considered a ratio of volatility to expected volume as a proxy for the information incorporated between trading periods, the behavior of the ratio over the trading day implied that information accumulation was more focused at the opening of the market. Bhandari (1988) documented an anomaly of the positive relation between leverage and average return. Fama & French (1988) used D/P to forecast returns on the value and equally weighted portfolios of NYSE for horizons from one month to five years. As expected, D/P explained small fractions of monthly and quarterly return variations. Sakata & White (1998) studied on volatility in developed stock market suggested the presence of conditional volatility. De Lima (1998) studied on volatility in developed stock market suggested the presence of nonlinearities. Bowers &

Dimson and Lakonishok & Smidt (1988) advocated for the use of stock market data from countries other than the United States in the study of specific time periods anomalies such as day of the week effect to obtain more proof for or against these anomalies. Connolly (1989) showed that there is much evidence that stock returns have time varying volatility. Keim & Stambaugh (1984) showed the low Monday returns are even partially due to the positive errors in prices on Friday and if these errors vary over time, then higher than average errors on Friday would tend to produce lower than average returns on Monday. Keim (1989) showed that the weekend effect may also be related to systematic movements within the bid-ask spread. Hess (1981) showed that return variance is higher on Mondays for US. Information that accumulates when financial markets are closed is reflected in prices after the market reopens.

Cutler *et al.* (1989) indicated that macroeconomic news could explain only between one-fifth and one-third of the movements of a stock market index. Also concluded that it is difficult to link major market movements to release of economic or other information. Schwert (1989) found- although having weak evidence- macroeconomic volatility can help to predict stock return volatility, the amplitude of the aggregate stock volatility fluctuations is difficult to explain by simple stock valuation models, especially during Great Depression. Akgiray (1989) argued that the non-stationarity of variance in common stock returns is a function of the information arrival to the market. Richardson & Stock (1989) questioned the reliability of inference drawn from individual point estimates of long-horizon autocorrelations and variance ratios. Blanchard & Quah (1989) suggested an econometric technique to decompose a series into its temporary and permanent components. The fundamental feature of this Blanchard-Quah technique is that it imposes a long-run restriction on the VAR to identify the decomposition. Schwert (1989) conducted an extensive array of tests on the macroeconomic causes of stock market volatility over long runs of monthly data for the United States. Ross (1989) assumed that information arrives through a Martingale process. In no arbitrage condition return variance is directly related to the flow of information. Transaction arrivals are also likely related to this. Non-trading periods are no-information periods and price & return do not change during this type of period. Aggarwal & Rivoli (1989) found evidence of a day-of-the-week effect in the equity markets of Hong Kong, Korea, Taiwan, and Singapore. Baskin (1989) took a slightly different approach and examined the influence of dividend policy on stock

price volatility, as opposed to returns. Keim & Stambaugh (1984) called high Friday return and low Monday return as the 'day of the week' effect and the 'weekend (Monday) effect'. Bowers & Dimson (1988); Lakonishok & Smidt (1988) advocated for the use of stock market data from countries other than the United States in the study of specific time periods anomalies such as day of the week effect to obtain more proof for or against these anomalies. Jaffe & Westerfield (1985) observed that use of data from countries other than United States may provide support for or against the proposition that these anomalies are a worldwide phenomenon and are not due to specific institution arrangements in the United States.

4.3.2.1 (f) 1990s:

Lamoureux & Lastrapes (1990) gave evidence in favor of traded volume as proxy for a stochastic mixing variable. Engle & Ng (1993) defined the relation between the lagged unexpected return and the conditional variance as the news impact curve, since it measures how past news affect current volatility. Lamoureux & Lastrapes (1990) noticed that significant structural shifts in unconditional variance may reduce the measure of persistence of shocks to volatility (conditional variance).

Barclay (1990) extended the study of French & Roll (1986) by testing three hypotheses. His result was in favor of private information. In fact they didn't find any evidence for either public information or noise trading hypothesis. Booth & Chowdhury (1996) confirmed that stock return variances are larger during trading hours. They provided evidence consistent with private and public information hypothesis but against noise trading. Subrahmanyan (1991) showed that noise trading raises price volatility when informed investors are risk averse, because they respond less aggressively to an increase in noise trading then risk neutrals. De Long *et al.* (1990) examined that the presence of 'positive feedback trader' type noise traders may lead to increased volatility when informed speculators reinforce the market price movements. According to Loockwood & Linn (1990) variances during trading day are 2.34 to 4.37 times greater than the overnight period. Ho & Cheung (1994) indicated that to know if the higher return on a particular weekday is just a reward for higher risk on that day a formal test on the variations of volatility across days of the week is important. Fortune (1991) explained the weekend effect he suggests that firms and governments release good news during market trading,

and store up bad news after the close on Friday, when investors cannot react until the Monday opening.

McInish *et al.* (1990), considering brief periods found that, volatility is high near the open and close of the trading day. Volatility is greater, the greater the time since the last trade. Lamoureux & Lastrapes (1990) empirically investigated the possibility that the daily stock returns are generated by a mixture of distributions in which the stochastic mixing variable was hypothesized to be the rate of information arrival. They found that GARCH effects vanish when volume is introduced as a proxy for mixing variable. Nelson (1991), Pagan & Schwert (1990), Sentena (1992), Campbell & Hentschel (1992) and Engle & Ng (1993) reported evidence that suggested that a negative shock to stock returns will generate more volatility than a positive shock of equal magnitude. De Long *et al.* (1990) explained the deviation of the market and fundamental values including noise traders. He also explained that Presence of 'positive feedback trader' type noise traders might lead to increased volatility when informed speculators reinforce the market price movements. Jegadeesh (1990) questioned the reliability of inference drawn from individual point estimates of long-horizon autocorrelations and variance ratios. According to Lamoureux & Lastrapes (1990) volume is a proxy for the stochastic mixing variable that describes the rate of daily information arrival and is positively related to the variance of daily price changes. Pagan & Hong (1991), Nelson (1989, 1991) discovered a negative relation between the conditional mean and variance in a univariate analysis of price data. But when they introduced volume into the analysis (by conditioning on lagged volume), their previous result was reversed and a positive relation between conditional mean and variance was found. Chan, Hamao & Lakonishok (1991) found that book to market equity has strong explanatory power; after controlling for beta, the higher book to market ratios are associated with higher expected returns. Fortune (1991) explained the weekend effect and claimed that firms and governments release good news during market trading, and store up bad news after the close on Friday, when investors cannot react until the Monday opening.

Fama & French (1992) focused on dividends or other cash flow variables such as accounting earnings, investment, industrial production etc., to explain stock returns. Fama & French (1992) supported evidence against SLB model and commented that their result does not support the most basic prediction of the SLB model, that average stock returns

are positively related to market betas. Lindén & Suonperä (1993) found weak links between returns on financial and macroeconomic variables for the period from 1980 to 1990 in Finland. Bessembinder & Seguin (1993) provided an insight into the relationship between price volatility and trading volume and market depth in the futures market. By separating volume into expected and unexpected components, they test whether the effect of volume on volatility is 'homogeneous' and also test whether the volatility of prices is asymmetrically related to volume shocks. McQueen & Roley (1993) studies considered aggregate business factors as a forecasting factor of stock returns. Peel *et al.* (1993) investigated the issue of whether stock market volatility has increased over time. Timmermann (1993) examined the extent to which the volatility of stock prices determines their underlying value. Shalen (1993) observed peak volume and volatility to occur at the opening of trade and suggested that the 'dispersion of beliefs' regarding a weighted average of future prices was the cause of this phenomenon.

Mitchell & Mulherin (1994) found significant and robust relationships between public information and market activity. They concluded that the observed relationship is often as week as reported in prior research, and hence they confirm the difficulty of linking volume and volatility to observed measured of information. Cochrane (1994) argued that univariate estimation of stock prices will not reject the random walk hypothesis for short autoregression. Revealed the temporary shock to stock prices is persistent with a half-life of about 5-years. Also revealed that size of the temporary component is large – some 57% of the variance of returns is explained by temporary shocks. Jacquier *et al.* (1994), estimated a *univariate* stochastic volatility model. Rahman & Yung (1994) examined the issue of whether the world's financial and capital markets are now transmitting volatility more quickly. Ho & Cheung (1994) used the "Levene Statistic" to test for patterns in return volatility using daily returns on Asia-Pacific markets of Hong Kong, Malaysia, the Philippines and Singapore. Found in general that there is an inverse relationship between risk (as proxied by unconditional volatility) and return. Errunza *et al.* (1994), Geyer (1994) reported that variance of returns in time shows strong correlations with prior innovations. Ho & Cheung (1994) indicated that to know if the higher return on a particular weekday is just a reward for higher risk on that day a formal test on the variations of volatility across days of the week is important.

Antoniou & Holmes (1995) studied the impact that trading in FTSE 100 index futures has on the volatility of the FTSE 100 stock index using the GARCH model. They concluded that futures did impact on the stock price volatility. They attributed this to increased information in the market, and not speculation. Lee (1995) employed a less restricted two-variable autoregression involving stock price-dividend spreads and real stock prices. Pesaran & Timmermann (1995) supported the predictability of stock return. Majority of these studies have examined the dividend-price ratio as a forecasting factor of stock returns. Theodossiou & Lee (1995) did not found intertemporal relationship between volatility and expected returns in the USA. Gordon & Rittenberg (1995) analyzed the behavior of the Warsaw Stock Exchange in light of the efficient market hypothesis (EMH) and alternative models of market inefficiency, in terms of the actual behavior of stock prices for the period of 1 June 1993 to 27 July 1994. They found that EMH provides an inadequate explanation of investor behavior and its effect on stock price volatility in this market.

Booth & Chowdhury (1996) confirmed that stock return variances are larger during trading hours. They provided evidence consistent with private and public information hypothesis but against noise trading. Andersen (1996) developed an empirical model of the daily return-volume relationship, a market microstructure theory to merge the insights of the MDH. He combines several important features of these models – for instance an asymmetric information structure and the presence of liquidity or noise traders – with the MDH and the related concept of stochastic volatility. The resulting model called the Modified Mixture Model (MMM), is estimated with a dynamic AR (1) stochastic volatility process for the latent rate of information arrival, as proposed by Andersen (1994). Haugen & Jorian (1996) reported that the January effect has not declined in size during the past three decades in the United States. Dave E. Allen & Veronica Rachim (1996) found that there is a significant negative relationship between the payout ratio and price volatility. The major determinants of price volatility are basic earnings volatility and leverage. Findings of this study do not offer much support for those of Baskin. He reported a significant and dominating negative relationship between dividend yield and stock price volatility. Results rejected the hypothesis that dividend yield affects stock price volatility and suggest that the payout ratio, the size of the firm, the level of debt and earnings volatility is the dominant determinants. The rate of return is not supported, but

evidence is provided in support of the information effect. Findings are similar to those of Ball *et al.* (1979), who whilst reporting a negative relationship between dividend yield and market risk, suggested that a negative relationship between payout ratios and market risk was also implied by their results. The study does not endorse Baskin's (1989) suggestion that dividend policy *per se* affects stock price volatility. Sharma, Mouguoe and Kamath (1996) found that in the absence of volume as a mixing_variable the market indicator returns are best described by the GARCH model. They included volume as a proxy for information arrival in the conditional variance model helps in explaining the GARCH effects in stock returns, however, the GARCH effects do not completely vanish as a result of this inclusion.

Flores & Szafarz (1997), found high volatility in all the monthly stock price series on the Warsaw Stock Exchange in an investigation of the content of the information set used by the agents in the market. Dockery & Vergari (1997) examined the random walk hypothesis using variance test ratio on weekly returns for the Hungarian market and found that the Budapest stock exchange is a random walk market. Eva & Marianne (1997) found that significant relationships between stock market volatility and macroeconomic volatility are detected in the VAR estimations. Results indicate a predictive power in both directions- from stock market volatility to macroeconomic volatility and from macroeconomic volatility to stock market volatility. Tests of the joint and simultaneous explanatory power of the macroeconomic volatilities indicate that between one-sixth to above two-thirds of the changes in aggregate stock volatility might be related to macroeconomic volatility. Contrary to the results of Schwert (1989) some evidence of a negative relationship between stock market volatility and trading volume growth was also detected. This result could either be interpreted as an effect of idiosyncratic demand shifts canceling out as the thickness of the market is increasing, or as a sign of volume growth being some proxy for the level of economic activity. Clare, Garrett & Jones (1997) found by using the modified Levene test, it was possible to reject the null of homoscedasticity for the markets in the sample. The most consistent result from the ARCH procedure employed here is that volatility on Monday is significantly high, despite the inclusion of a measure of stock market volume. The Levene test results in Ho & Cheung (1994) and in this paper appear to support (at least partially) the constant information flow hypothesis. Ragunathan & Peker (1997) by separating volume and open interest into two components, expected and

unexpected variables, this study endeavored to determine the exact effect of those variables on volatility. Following are findings related to this-

(a) Conditional returns were not related to lag returns and were influenced by lagged volatilities for two contracts.

(b) Volatility in Australian futures market was more likely to be influenced by lagged volatility.

(c) Unexpected volume was more likely to have a greater impact on volatility than expected volume.

This study also documented the asymmetry between volume, open interest and volatility. The result leads to following conclusions-

(1) Positive volume shocks have a greater impact on volatility than negative shocks.

(2) A positive open interest shock is more likely to have an impact on volatility than a negative shock. Therefore, it can be concluded that market depth does have an effect on volatility.

Liesenfeld (1998) revealed some shortcomings of the standard mixture hypothesis. In a direct test of the standard mixture model, Richardson & Smith (1994) stated that linking price changes and trading volume to the same latent information flow via a bi-variate conditional *normal* distribution may not be the correct specification. Lamoureux & Lastrapes (1994) estimated the time series behavior of the mixing variable and concluded that it does not account fully for the observed persistence in volatility. Poshakwale & Wood (1998) reported presence of persistent volatility and non-linearity in returns using daily data from two main indices and equally weighted portfolio of 17 stocks in the exchange. Angelos Kanas (1998) found that Olan Henry (1998) has used a partially non-parametric model of the relationship between news and volatility estimation and found that, the standard GARCH (1,1) model, which imposes symmetry on the conditional variance of stock returns, is shown to produce biased estimates of h_t when stock price movements are large and negative $(\varepsilon_{t-1} < 0)$. The estimated news impact curve for the GARCH (1,1) suggests that h_t is underestimated for large negative shocks and overestimated for large positive shocks. A robustified Wald test for integration in variance suggests that shocks to volatility are infinitely persistent, in the sense that the optimal k-

step-ahead linear forecast of the conditional variance continues to depend on the initial conditions for all forecast horizons. Using the regression based methodology suggested by Psaradakis & Tzavalis (1995) the null of infinite persistence in variance is not satisfied. Kearney & Daly examined various news impact curves and found that the EGARCH (1,1) model is overly sensitive to extremely large positive and negative shocks. The conditional variance equation of the GJR model contains two parameters β and δ that are, at best, marginally significant. The QGARCH model appeared to be the most adequate characterization of the underlying data generating process. The paper developed and estimated a model, which is capable of explaining movements in the conditional volatility of Australian All Industrials Stock Market Index. Their results constitute new evidence, which is interpretable as an extension of the low frequency analysis of Schwert (1989) who did not include international factors such as the current account deficit and the exchange rate in his investigation of the causes of stock market volatility in the United States. Employed estimation strategy to overcome the generated regressors problem. This problem was overcome by jointly estimating the equation for the conditional volatility of the stock market returns together with the equations determining the conditional volatilities of all variables included in the model using the generalized least squares (GLS) estimation procedure and the Hendry general-to-specific estimation strategy. Most important determinants of the conditional volatility of the Australian stock market found are-

(a) *Directly associated with stock market volatility*: conditional volatilities of inflation and interest rates.

(b) *Indirectly associated with stock market volatility*: conditional volatilities of industrial production, the current account deficit and the money supply. Among these variables the strongest effect was found to be from the conditional volatility of money supply. No statistically significant effect of conditional volatility of foreign exchange market was found according to evidences.

Mahieu & Bauer (1998) have applied a different estimation procedure i.e. a Markov Chain Monte Carlo based on Bayesian analysis which has the clear advantage that an estimate of the latent process can be produced. Their simulation results of the univariate stochastic

volatility model confirm Andersen's result that the persistence parameter is close to unity for the liquid IBM stock return series. Monte Carlo standard errors are, rather large for the other parameters, which indicate that the results are relatively unstable for the univariate model. Results for the bivariate mixture model are more robust in the sense that the marginal distributions of the simulated parameters are much less skewed and kurtotic. The most important result, as mentioned in the paper, is that the persistence in volatility does not decrease in the bivariate model. Using the same return and volume series (IBM) and a specification similar to that of Andersen (1996), a high persistence in volatility is still found in the bivariate case. Furthermore it is found that a smaller part of daily trading volume is directly related to the unobservable information process.

Lo & Mackinby (1990) introduced the existence of a true price even when the market is closed or when there is no trade in open market. Thus return is generated over weekends or evenings when trade is closed & in thin markets when assets are not being traded. These models assume price change as independent of when and how trade occurs. Brodsky & Hurvich (1999) showed that it is important to use a long memory model for multi-step forecasting. The Monte Carlo experiments in the same paper demonstrate that forecasting methods based on ARMA modeling can deteriorate significantly if they are used to forecast long memory series, especially when model parameters are unknown. Lima A. Gallagher has supported the earlier findings that real stock prices contain a statistically significant mean-reverting component. The estimated temporary component explains between 7 and 64% of the variation in real stock returns and thus real returns are to some extent predictable. The impulse response functions of a temporary shock on real stock prices show that for some countries the mean-reverting component can be quite persistent, with estimated half lives varying between 1 and up to 25 quarters. The multi-country analysis emphasizes that the dynamic response of stock prices to temporary and permanent shocks varies across markets. A number of common features include: real stock prices rise in response to a permanent shock to stock prices and continue to rise for a number of years after the shock; the mean-reverting component is statistically significant at standard significance levels. A positive permanent shock to real stock prices increases stock prices, whereas a temporary shock increases real stock prices only in the short run, with zero long run effect. A positive temporary shock to consumer prices increases consumer prices,

whereas a positive permanent shock to consumer prices decreases consumer prices. The issue of whether mean reversion reflects market inefficiency is debatable and - linked to the joint hypothesis problem – is unlikely to be resolved. The association between a significant mean-reverting component and predictability of stock returns has potentially several other implications for investors. For example, the presence of a mean-reverting component suggests using a portfolio strategy that includes equities that have recently declined in value.

4.3.2.2. 21st Century

According to P.B. Solibakke (2000) return measures are not known for different periods over weekends, holidays, month or the year. Return variances are not known to be lower during periods when the market is closed including weekends. Return variances do not exhibit season differences. Transaction arrivals do not appear to arrive independently over time. Rather variance and volume are jointly determined both cross-sectional and over time. Variances for all non-trading periods did conform to the random walk model when the market is open and didn't when the market is closed. In case of infrequent trading the model given in this study analytically shows that while observed mean returns are unbiased, observed variances are consistently overstate true variances. Sunil Poshakwale & Victor Murinde (2001) suggested that the volatility can be best specified as a process of conditional heteroscedasticity in both the Hungarian and Polish markets. The GARCH models outperform the conventional OLS models and though returns show significant first order autoregression, an ARMA (1,0) model fails to capture nonlinear dependencies. The well-known day-of-the-week effect, reflected in significantly positive Friday and/or negative Monday returns commonly found in most markets, do not appear to be present in the Hungarian and Polish stock markets. This paper also suggested that the Martingale hypothesis, that future changes of the daily stock prices in the Hungarian and Polish stock markets are orthogonal to the past information, could be significantly rejected. In both markets, volatility seems to be of a persistent nature; however, as measured by a GARCH-M model this does not seems to be priced. Findings also suggested market decline in conditional volatility for the Polish market after June 1995. According to Leon, H., Nicholls, S. & Sergeant, K. (2000), Portfolios of Commercial Banking and Conglomerates were found to be the most responsive to broad market movements and hence most liable to yield higher returns to investors. Portfolios of Trading & Property were found to be the less responsive to movements in the market index and hence less liable to yield returns above that of the market index. Volatility appears to have been greater during periods of macroeconomic instability and political unrest. Choudhry, T. (2000) investigated if there exists any day of the week effect on return in emerging Asian stock markets. Results show significant presence of 'day of the week' effect and 'weekend (Monday) effect'. This study conducted empirical research on daily returns from India, Indonesia, Malaysia, Philippines, South Korea, Taiwan and Thailand which confirms the notion that these

market anomalies are not just features of the stock markets of United States or other developed countries but also of the emerging markets. In this study volatility (conditional variance) is also found to be affected by both 'day of the week' effect and 'weekend effect'. The significant day of the week effect **on return** found in this paper cannot be explained based on the settlement procedure but results do indicate some evidence of a possible spill-over from the Japanese market. But this effect **on volatility** may be in line with the information availability theory.

4.3.3. Summary of findings of previous empirical studies:

Authors and Year	Data Set (Sample Size, Study Period and Market)	Method(s) Used	Findings
SUNIL POSHAKWALE, VICTOR MURINDE (2001)	Daily closing prices from the BUX (comprising 17 Hungarian stocks) and the Warsaw General Index of 20 (WIG-20) are used for the period beginning January 01 and April 16, 1994, respectively, to June 30, 1996. Also daily exchange rate data for the Polish Zloty and the Hungarian Forint, each against the German Mark and the British Pound are obtained for the same period.	BDSL – statistics, LM tests, GARCH procedure, ARIMA models, unit root test, ARCH – LM test, χ^2, ADF test, ARMA (1,0), ARCH model, LR test, AIC, SBC, GARCH-M, Ljung – Box Q statistics	1) Results suggested that the volatility can be best specified as a process of conditional heteroscedasticity in both the Hungarian and Polish markets. 2) The GARCH models outperform the conventional OLS models and though returns show significant first order autoregression, an ARMA (1, 0) model fails to capture nonlinear dependencies. 3) The well-known day-of-the-week effect, reflected in significantly positive Friday and/or negative Monday returns commonly found in most markets, do not appear to be present in the Hungarian and Polish stock markets. 4) This paper also suggested that the Martingale hypothesis, that future changes of the daily stock prices in the Hungarian and Polish stock markets are orthogonal to the past information, can be significantly rejected. 5) In both markets, volatility seems to be of a persistent nature; however, as measured by a GARCH-M model this does not seems to be priced. Findings also suggested market decline in conditional volatility for the Polish market after June 1995.
P. B.	The study used daily	Mean,	*Return means are not known to differ

SOLIBAKKE (2000)	and return series for Norwegian stocks spanning the period from October 1983 to February 1994. This database has at most 2611 observations for each firm.	Variance, Mean Variance, Mean Variance Ratio, t -test, F -test.	over weekends, holidays, or month of the year. *Return variances are not known to be lower during periods when the market is closed including weekends *Return variances do not exhibit season differences. *Transaction arrivals do not appear to arrive independently over time. Rather variance and volume are jointly determined both cross-sectional and over time. *Variances for all non-trading periods did conform to the random walk model when the market is open and didn't when the market is closed. *In case of infrequent trading the model given in this study analytically shows that while observed mean returns are unbiased, observed variances are consistently overstate true variances.
HYGINUS LEON, SHELTON NICHOLLS, KELVIN SERGEANT (2000)	Composite stock price index (SPI); the indices for the subsectors of Commercial Banks (*CMBK*), Conglomerates (*CONG*), Manufacturing 1 (*MAN1*), Manufacturing 2	Mean & Variance (recursive), Jarque – Beta test for normality, CAPM, GARCH, EGARCH, OLS, t - test, R ESET test, CUSUM plots.	1) *Findings related to return in TTSE:* (a) Portfolios of Commercial Banking and Conglomerates were found to be the most responsive to broad market movements and hence most liable to yield higher returns to investors. (b) Portfolios of Trading & Property were found to be the less responsive to movements in the market

	(*MAN2*), Trading (*TRAD*), and Property (*PROP*) – all from 1983 to 1995 of Trinidad and Tobago Stock Exchange. The sample size is 664 observations.		index and hence less liable to yield returns above that of the market index. 2) *Findings related to volatility in TTSE:* Volatility appears to have been greater during periods of macroeconomic instability and political unrest.
TAUFIQ CHOUDHRY (2000)	Log of daily stock prices from January 1990 to June 1995 are applied in this study. The actual stock indices from following markets are used: Bombay stock exchange 100, India; Jakarta composite index, Indonesia; Kuala Lumpur stock exchange composite index, Malaysia; Manila stock exchange composite, Philippines; Korea south composite, South Korea; Taiwan stock exchange index, Taiwan; Securities exchange of Thailand index, Thailand	GARCH(p, q), battery of standard specification tests, serial correlation test of white noise, GARCH-t, Spill-over test, correlation.	1) Investigated if there exists any day of the week effect on return in emerging Asian stock markets. Results show significant presence of 'day of the week' effect and 'weekend (Monday) effect'. 2) This study conducted empirical research on daily returns from India, Indonesia, Malaysia, Philippines, South Korea, Taiwan and Thailand which confirms the notion that these market anomalies are not just features of the stock markets of United States or other developed countries but also of the emerging markets. 3) In this study volatility (conditional variance) is also found to be affected by both 'day of the week' effect and 'weekend effect'. 4) The significant day of the week effect **on return** found in this paper cannot be explained based on the settlement procedure but

			results do indicate some evidence of a possible spill-over from the Japanese market. But this effect **on volatility** maybe in line with the information availability theory.
DAVID McMILLAN, ALAN SPEIGHT, OWAIN APGWILYM (2000)	*Daily 2869 (Monthly 132, Weekly 574) closing price data from January 02, 1984 to July 31, 1996 of Financial Times-Stock Exchange 100 index (FTSE100). *Daily 6783 (Monthly 312, Weekly 1357) closing price data from January 01, 1969 to July 31, 1996 of Financial Times-Actuaries (FTA) All Share index.	*ME* (mean error), *MAE* (mean absolute error), *RMSE* (root mean squared error), *MME(U)* [mean mixed error (when under predictions are penalized heavily)], *MME(O)* [mean mixed error (when over predictions are penalized heavily)], Historical mean, Moving average, Random walk, Exponential smoothing, EWMA (Exponentially weighted moving average), Simple (mean) regression, GARCH, TGARCH, EGARCH, CGARCH, Recursively estimated models.	1) When asymmetric loss is considered: (a) If over predictions are penalized more heavily than under predictions, the random walk model is favored. (b) If under predictions are penalized more heavily than over predictions, then the historical mean is favored for the forecasting of daily FTA & FTSE volatility, while the historical mean & simple regression are jointly favored for weekly FTA volatility, and exponential smoothing is favored for weekly FTSE volatility forecasting. 2) When symmetric loss is considered: (a) Random walk model provides vastly superior monthly volatility forecast. (b) Random walk, moving average, and recursive smoothing models provide moderately superior weekly volatility forecasts. (c) GARCH, moving average, and exponential smoothing models provide marginally superior daily volatility forecasts. 3) (a) When the crash of 1987 is included in the estimation sample, random walk model showed dominance supporting the study of Franses & van Dijk (1996). (b) GARCH forecast is improved when that crash is excluded from estimation sample.

			4) Under symmetric loss condition & the proposal of one forecasting method: For all frequencies, the most consistent forecasting performance is provided by moving average and & GARCH model. 5) Results suggest that, previous results reporting that the class of GARCH models provides relatively poor volatility forecasts may not be robust at higher frequencies, failing to hold here for the crash adjusted FTSE 100 index in particular.
MIKE K. P. SO (2000)	*Daily price data from July 02, 1962 to December 30, 1995 of The Standard and Poor's 500 Stock Index (S & P 500). *July 02, 1962 to June 01, 1995 of Dow Jones Industrial Average index (DJIA). *July 02, 1962 to December 30, 1995 of 30 constituent stocks of the DJIA index.	Modified range over standard deviation (R/S) test, the GPH test.	1) (1)Applying two procedures, the modified R/S test & the GPH test, and adopting three proxies of the variability of returns: the absolute mean deviation, the squared mean deviation & the logarithm of absolute mean deviation, this study found strong evidence of long-term dependence in volatility is found in nearly all cases. 2) (2)According to this study, result suggests that it is important to incorporate the long memory feature in the modeling of volatility in order to produce good volatility forecasts and derivative pricing formulas.
PHILIP HANS FRANSES, RICHARD PAAP (2000)	Daily price data from January 01, 1980 to September 28, 1994 of The Standard and Poor's 500 Composite Index (S & P 500).	PAR – PIGARCH	1) This paper proposed a time series model. The model is a periodic autoregression with periodically integrated GARCH [PAR-PIGARCH]. 2) It was found that the PAR-PIGARCH model encompasses

			alternative periodic models that can be found in the literature. 3) With this statistically adequate PAR-PIGARCH model, positive (negative) autocorrelation is found in the returns on Monday (Tuesday). 4) Day-of-the-week variation in the persistence of volatility is also found using this model.
MATHIAS BINSWANGER (2000)	• Quarterly real stock prices from 1953 to 1995 of The Standard and Poor's 500 Composite Index (S & P 500). • Seasonally adjusted total industrial production index from the Federal Reserve board From 1953 to 1995. (1992 = 100).	Augmented Dickey-Fuller tests, Granger causality tests, Monthly regression test, Quarterly regression test, Chow breakpoint test, F -test.	1) The paper presents evidence that current stock returns do not seem to contain significant information about future real activity as before. There is a breakdown in the relation between stock returns and future real activity in the US economy since the early 1980s. 2) Because the period (1984-1995) of absence of that relation is rather short, it is not assured yet whether the result should be interpreted as a temporary aberration or whether it is of a permanent nature. 3) The study considered the existence of (positive) speculative bubbles or fads to be the most likely explanation of that finding. Although no direct proof for this hypothesis is offered because of the impossibility to distinguish bubbles from unobserved fundamental factors.
M. F. OMRAN, E. MCKENZIE (2000)	Return and volume for the period from 4/1/1988 to 28/2/1994 of 50 of	GARCH (1,1), BHHH maximization routine (Berndt *et*	1) This study found that although the parameter estimates of the GARCH model become insignificant when volume of

	biggest 100 British companies.	*al.*, 1974), Mcleod & Li (1983) Q – statistic, Ljung & Box (1978) Q – statistic, χ^2	trade is used in the conditional variance of returns, the autocorrelations of the squared residuals still exhibit a highly significant GARCH effects. 2) Evidence is found that there is a strong association in the timing of innovational outliers in returns and volume.
LIAM A. GALLAGHER (1999)	Quarterly stock price data for the period 1957:1 to 1995:4 from following 16 countries are taken as sample- Austria, Belgium, Canada, Finland, France, Germany, India, Italy, Japan, Netherlands, Norway, South Africa, Sweden, Switzerland, the UK and the USA.	Blanchard – Quah decomposition technique, Augmented Dickey – Fuller (ADF) test, Phillips – Perron Z_t (PP) test, Ljung – Box Q-statistic, the Bayes Information Criterion, t-test, R^2.	*The evidence supports the earlier findings that real stock prices contain a statistically significant mean-reverting component. The estimated temporary component explains between 7 and 64% of the variation in real stock returns and thus real returns are to some extent predictable. *The impulse response functions of a temporary shock on real stock prices show that for some countries the mean-reverting component can be quite persistent, with estimated half lives varying between 1 and up to 25 quarters. *The multi-country analysis emphasizes that the dynamic response of stock prices to temporary and permanent shocks varies across markets. A number of common features include: real stock prices rise in response to a permanent shock to stock prices and continue to rise for a number of years after the shock; the mean-reverting component is statistically significant at standard significance levels. *A positive permanent shock to real stock prices increases stock prices,

			whereas a temporary shock increases real stock prices only in the short run, with zero long run effect. A positive temporary shock to consumer prices increases consumer prices, whereas a positive permanent shock to consumer prices decreases consumer prices. *The issue of whether mean reversion reflects market inefficiency is debatable and - linked to the joint hypothesis problem – is unlikely to be resolved. *The association between significant mean-reverting component and predictability of stock returns has potentially several other implications for investors.
OLAN HENRY (1998)	The data consist of 1415 observations of the closing value of the Hang Seng Index, from the Hong Kong stock market, sampled daily from 01/01/1990 to 12/06/1995.	Test of tenth order ARCH, Ljung – Box Q statistic, Ramsey's (1969) R ESET test, Bera – Jarque test for normality, Broyden-Fletcher-Goldfarb-Shanno (BFGS) algorithm, GARCH, EGARCH, GGARCH, GJR, PNP, GQARCH, robustified wald test, QML estimator.	1) The standard GARCH (1, 1) model, which imposes symmetry on the conditional variance of stock returns, is shown to produce biased estimates of h_t when stock price movements are large and negative $(\varepsilon_{t-1} < 0)$. The estimated news impact curve for the GARCH (1, 1) suggests that h_t is underestimated for large negative shocks and overestimated for large positive shocks. 2) A robustified Wald test for integration in variance suggests that shocks to volatility are infinitely persistent, in the sense that the optimal k-step-ahead linear forecast of the conditional

			variance continues to depend on the initial conditions for all forecast horizons. Using the regression based methodology suggested by Psaradakis & Tzavalis (1995) the null of infinite persistence in variance is not satisfied. 3) Examinations of various news impact curves suggested that the EGARCH (1, 1) model is overly sensitive to extremely large positive and negative shocks. 4) The conditional variance equation of the GJR model contains two parameters β and δ that are, at best, marginally significant. 5) The GQARCH model appeared to be the most adequate characterization of the underlying data generating process.
COLM KEARNEY, KEVIN DALY (1998)	Monthly observations of following Australian stock market and business cycle variables over the July, 1970 to January, 1994 are used— Australian sharemarket All Industrial Index, the monthly percentage change in the index of industrial production, the monthly index of wholesale prices in Australia, the	GLS estimation methodology, Davidian & Carroll (1987) ARCH model, Hendry general-to-specific estimation methodology, Ljung – Box Q statistics, F - statistics, the Durbin – Watson (DW) statistics, Kolmogorov – Smirnov (K—S) statistics	1) The paper developed and estimated a model which is capable of explaining movements in the conditional volatility of Australian All Industrials stock market index. 2) The results in this paper constitute new evidence which is interpretable as an extension of the low frequency analysis of Schwert (1989) who did not include international factors such as the current account deficit and the exchange rate in his investigation of the causes of stock market volatility in the United States. 3) Employed estimation strategy to

	monthly percentage change in the wholesale price in Australia, the current account deficit of the database of payments in Australia, the spot exchange rate of the Australian – US dollar exchange rate, the interest rate on 3-month bank accepted bills in Australia.	Chow tests, Dickey – Fuller test, Phillips – Perron test, SEE, SSR.	overcome the generated regressors problem. This problem was overcome by jointly estimating the equation for the conditional volatility of the stock market returns together with the equations determining the conditional volatilities of all variables included in the model using the generalized least squares (GLS) estimation procedure and the Hendry general-to-specific estimation strategy. 4) Most important determinants of the conditional volatility of the Australian stock market found are- (c) Directly associated with stock market volatility: conditional volatilities of inflation and interest rates. (d) Indirectly associated with stock market volatility: conditional volatilities of industrial production, the current account deficit and the money supply. Among these variables the strongest effect was found to be from the conditional volatility of money supply. No statistically significant effect of conditional volatility of foreign exchange market was found according to evidences.
RONALD MAHIEU, ROU BAUER (1998)	Total 4693 return observations for the investigation period January 02, 1973 to December 23, 1991 were used. Closing	Modified Mixture Model (MMM) proposed by Andersen (1996), Markov Chain Monte Carlo	1) Applied a different estimation procedure: a Markov Chain Monte Carlo based on Bayesian analysis which has the clear advantage that an estimate of the latent process

	prices were obtained from the *Standard & Poor's Daily Stock Price Guide* for IBM stock return and volume series.	(MCMC) method, Bayesian analysis, the pseudo Metropolis-Hastings algorithm of Tierney (1994), SV model, multi-move block procedure for the structural parameters.	can be produced. 2) Simulation results of the univariate stochastic volatility model confirm Andersen's result that the persistence parameter is close to unity for the liquid IBM stock return series. 3) Monte Carlo standard errors are, rather large for the other parameters, which indicates that the results are relatively unstable for the univariate model. Results for the bivariate mixture model are more robust in the sense that the marginal distributions of the simulated parameters are much less skewed and kurtotic. 4) The most important result, as mentioned in the paper, is that the persistence in volatility does not decrease in the bivariate model. Using the same return and volume series (IBM) and a specification similar to that of Andersen (1996), a high persistence in volatility is still found in the bivariate case. Furthermore it is found that a smaller part of daily trading volume is directly related to the unobservable information process.
VANITHA RAGUNATHAN, ALBERT PEKER (1997)	Daily settlement prices, trading volumes and open interest for outstanding maturities between January 1992 and December 1994 from	Conditional mean equation, Conditional volatility equation, Augmented Dickey Fuller tests, AR model, ARIMA model, Box –	1) By separating volume and open interest into two components, expected and unexpected variables, this study endeavored to determine the exact effect of those variables on volatility. Following are findings related to this-

	following sources: 1. 90-day bank-accepted bill futures (BABS) 2. 3-year Commonwealth Treasury bond futures 3. 10-year Commonwealth Treasury bond futures 4. All Ordinaries Share Price Index future contracts, provided by the Sydney Futures Exchange.	Pierce Q statistics, χ^2, R^2, t-test, F-test.	(d) Conditional returns were not related to lagged returns and were influenced by lagged volatilities for two contracts. (e) Volatility in Australian futures market was more likely to be influenced by lagged volatility. (f) Unexpected volume was more likely to have a greater impact on volatility than expected volume. 2) This study also documented the asymmetry between volume, open interest and volatility. The result lead to following conclusions- (a) Positive volume shocks have a greater impact on volatility than negative shocks. (b) A positive open interest shock is more likely to have an impact on volatility than a negative shock. Therefore, it can be concluded that market depth does have an effect on volatility.
EVA LILJEBLOM, MARIANNE STENIUS (1997)	1. Stock return data used in this study consists of logarithmic differences of	GARCH, two-variable twelfth-order vector autoregressive (VAR) model,	Findings of this study are surprisingly good compared with those generally obtained from US data. 1) Significant relationships between stock market volatility and

	monthly values of the Unitas index. 2. Variable measuring the monthly stock market trading volume is used in this study. 3. A measure for industrial production, IP. 4. The money supply, M2. 5. Consumer price index, CPI. 6. A terms of trade variable, (measured as the export price index divided by the import price index), ToT. The US data used in this study starts from January, 1920 for all data series with the exception of the IP, which starts from January, 1922. Data up to 1991 are used.	F -test R^2, LM test, LR test, t -test.	macroeconomic volatility are detected in the VAR estimations. Results indicate a predictive power in both directions- from stock market volatility to macroeconomic volatility and from macroeconomic volatility to stock market volatility. 2) Tests of the joint and simultaneous explanatory power of the macroeconomic volatilities indicate that between one-sixth to above two-thirds of the changes in aggregate stock volatility might be related to macroeconomic volatility. 3) Contrary to the results of Schwert (1989), some evidence of a negative relationship between stock market volatility and trading volume growth was also detected. This result could either be interpreted as an effect of idiosyncratic demand shifts canceling out as the thickness of the market is increasing, or as a sign of volume growth being some proxy for the level of economic activity.
PATRICIA FRASER, DAVID POWER (1997)	Weekly price data were obtained for five Pacific Rim countries – Hong Kong (Hang Seng Index), Japan (Tokyo Stock Exchange), Singapore (the Singapore All Share	GARCH, Sign Bias Test, Negative Size Bias Test, Positive Size Bias Test, t - test, LM statistic, R^2,	1) For Japan, Malaysia and the UK, market conditions may enable us to predict the volatility of returns from these markets. 2) Analysis of the Malaysia and Singapore equity data indicates that their weekly conditional volatilities are substantially correlated

	Index), Malaysia (the Kuala Lumpar Composite Price Index), Australia (the Australian All Ordinary Index), UK (the FT All Share Price Index) and USA (the New York Stock Exchange Composite Price Index).	Phillips – Perron (PP) tests, LM bias test, Q – statistics.	reflecting the regional integration of these two markets. The Malaysian market adjusts more slowly to information than the neighboring Singapore market. 3) The Hong-Kong equity market exhibited a relatively high degree of persistence of volatility shocks. The evidence from the Hong-Kong market supports the hypothesis that while trading volume news is important in the process determining contemporaneous volatility, it has no impact on future volatility. 4) For Australia, some weak evidence that current and lagged news in this market may be related to the persistence of volatility shocks is found. 5) For the US market no evidence is found that either past market performance or news had an impact on conditional volatility.

ANDREW CLARE, IAN GARRETT, GREG JONES (1997)	Total 2210 observations of daily stock market index and volume values from January 03, 1986 to June 26, 1994 are used from — Australia (All Share Index), Hong Kong (Hang Seng Index), Malaysia (Kuala Lumpur Stock Exchange Composite Index), Philippines (Manilla Composite Index), Singapore (Straits Times Index)	GARCH (p, q) model, Levene test, Kruskall – Wallis test.	Using the modified Levene test, it was possible to reject the null of homoscedasticity for the markets in the sample. 1) The most consistent result from the ARCH procedure employed here is that volatility on Monday is significantly high, despite the inclusion of a measure of stock market volume. 2) The Levene test results in Ho & Cheung (1994) and in this paper appear to support (at least partially) the constant information flow hypothesis.
DAVE E. ALLEN, VERONICA S. RACHIM (1996)	Data of 173 sample companies on yearly high & low share price, bonus/right issue or stock splits adjusted share prices, announcement date of capitalization change, etc. are collected from *Australian Stock Exchange Journal* for the period 1972 — 1985.	Cross-sectional OLS regression, t -test, F -test.	1) Results suggest that there is a significant negative relationship between the payout ratio and price volatility. 2) The major determinants of price volatility are basic earnings volatility and leverage. 3) Findings of this study do not offer much support for those of Baskin (1989). He reported a significant and dominating negative relationship between dividend yield and stock price volatility. 4) Results rejected the hypothesis that dividend yield affects stock price

			volatility and suggest that the payout ratio, the size of the firm, the level of debt and earnings volatility are the dominant determinants. The rate of return is not supported, but evidence is provided in support of the information effect. 5) Findings are similar to those of Ball et al. (1979), who whilst reporting a negative relationship between dividend yield and market risk, suggested that a negative relationship between payout ratios and market risk was also implied by their results. 6) The study does not endorse Baskin's (1989) suggestion that dividend policy per se affects stock price volatility.
JANDHYALA L. SHARMA, MBODJA MOUGOUE, RAVINDRA KAMATH (1996)	Daily returns and corresponding volume data from 1986 to 1989 of New York Stock Exchange (NYSE) index.Observation is 1008.		

4.3.4. Concluding remarks:

Hetroscedasticity (non-stationarity among residual terms) is considered as one of the most important issue of empirical research. Because for making any investment decision it is required to forecast about future market. Investors desire to estimate the future price movement and return movement that will determine the expected rate of return for them. If the forecasting is only based on some important factors by ignoring the effect of lag dependent variable then the estimation may not correct. So for taking proper investment decision the forecast should be based on current period's independent variables as well as lag periods dependent variable as one of the independent variable, because there may be integrated autocorrelation.

CHAPTER - FIVE

RESEARCH DESIGN AND METHODOLOGY

5.1. Introduction:

Research is defined as any organized inquiry carried out to provide information for the solution of a specific problem. However, research methodology is the process where there is a clear purpose and objective, define the research problem and develop strategies for the solution of problems that have been identified. In general, the research methodology consists of four major stages: exploration of the situation, development of the research design, data collection and analysis and interpretation of the results. Moreover, research methodology is the way to handle research problems. There are two methods of research: homothetic and ideographic. These two research methods are also known as quantitative or deductive method and qualitative or inductive method. Typically quantitative technique deals with either primary or secondary data and solves the research problem through parametric or nonparametric statistical tests. On the other hand qualitative technique deals with the behavioral or theoretical research. This chapter primarily discusses on general characteristics of the research methodologies and explains the justification of choosing quantitative research method for this study. This chapter also explains secondary data collection procedure, secondary data analysis techniques and justifies the choice of secondary data analysis techniques for this empirical study.

5.2. Choice of research methodology:

There are two types of research methods: homothetic and ideographic. Homothetic methodologies have an emphasis on the importance of basing research upon systematic protocol and technique. This is epitomized in the approach and methods employed in the natural science, which focus upon the process of testing hypotheses in accordance with the standards of scientific rigor. Standardized research instruments are prominent among these methodologies. Emphasis is therefore placed upon covering explanations and deduction using quantified operationalization of concepts in which the element of motive or purpose or meaning is lost, because of the need for precise models and hypotheses for testing. This research is also called deductive method of research. A deductive research method entails the development of a conceptual and theoretical structure prior to its

testing through empirical observation. Ideographic methodologies on the other hand, emphasize the analysis of subjective accounts that one generates by 'getting inside' situations and involving oneself in the everyday flow of life. There is an emphasis upon theory grounded in such empirical observations, which takes account or subjects meaning and interpretational systems in order to gain explanation by understanding. However, this method is also called inducting method of research. The logical ordering of induction is the reverse of deduction as it involves moving for the 'plane' of observation of the empirical world to the construction of explanation and theories about what has been observed. In addition, Easterly-Smith, named these two methods as positivism and phenomenology. Positivism views reality as external and objective, with the role of research cost as making reliable and valid observation of this reality in order to test fundamental laws hypothesized from existing theory. In contrast phenomenological approach is inductive in that researchers build theories and propositions only following a detailed understanding of experience (Creswell, 1994).

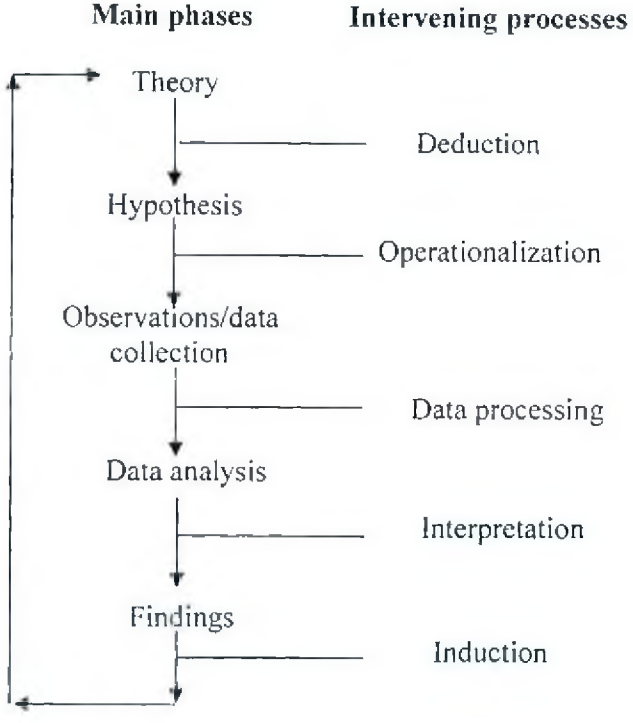
These two research methods are also known as: quantitative method and qualitative method. Bryman (1988) defined quantitative and qualitative research as,

"Quantitative research is then a genre which uses a special language which appears to exhibit some similarity to the ways in which scientists talks about how they investigate the natural order—variables, control, measurement, experiment" **(p-12)and** ***" The best known of these methods is participant observation, which entails the sustained immersion of the researcher among those whom he or she seeks to study with a view to generating a rounded, in-depth account of the group, organization or whatever".*** **(P-45)**

The practitioners often conceptualize quantitative research as having a logical structure in which theories determine the problems to which researchers address themselves in the form of hypotheses derived from general theories. However, Creswell (1994) indicates that quantitative studies are characterized by the use of deductive form of logic wherein theories and hypothesis are tested in a cause and effect order. Concepts, variables and hypotheses are chosen before the study begins and remain fixed throughout the study.

However, Bryman (1998) mentioned the quantitative research as linkage between partly to positivism and partly to diffuse and general commitment to the practices of the natural scientists. It seems more sensible to see more of them as a manifestation of a vague commitment to the ways of the natural sciences. It also seems to be that there may be aspects of the general approach of quantitative researches which are not directly attributable to either positivism or to the practices of the natural sciences. Moreover, qualitative research is interactive research where the bases, values and judgment of the researchers become stated explicitly in the research report.

Figure 5.1: The Logical Structure of the Quantitative Research Process:



However, Gharry noted that the main difference between qualitative and quantitative research is not in quality but also in procedure. In qualitative research statistical methods or other procedures of quantification are not arrived at findings. The difference between quantitative and qualitative methods is not just a question of quantification but also a reflection of different perspectives on knowledge and research objectives.

Table- 5.1: Differences between quantitative and qualitative research:

Aspects of difference	Quantitative	Qualitative
1. Role of research	Preparatory	Means to exploration of actor's interpretation
2. Relation between researcher and subject	Distant	Close
3. Researchers stance in relation to subject	Outsider	Insider
4. Relation between theory, concepts and research	Confirmation	Emergent
5. Research strategy	Structured	Unstructured
6. Scope of findings	Homothetic	Ideographic
7. Image of social reality	Static and external to actor	Procession and socially constructed by actor
8. Nature of data	Hard, reliable	Rich, deep

Moreover, quantitative research is typically taking to be exemplified by the social survey and by experimental investigation. In contrast, qualitative research tends to be associated with particular observation and unstructured, in depth interviewing.

Closely allied to the two philosophical paradigms is the choice between qualitative and quantitative research methodologies. Maanen (1983) defined qualitative methods as an array of interpretative techniques which seek to describe, decode, translate and otherwise come to terms with the meaning not the frequency of certain more or naturally occurring phenomena in the social world. The primary techniques associated with qualitative methods are interviews, observation and diary methods. However,

qualitative methodology provides the researcher with an opportunity to prove a small number of samples in depth to uncover new clues, open up new dimension of a problem and secure imagination, accurate and inclusive accounts that are based on personal experience. Moreover, qualitative design is inherently complex and time consuming as design rules and procedures are not fixed.

It is well known that quantitative method is more suitable for testing the consequence of theory. Researchers agreed that quantitative research method is suitable and easier in case of longitudinal studies that men are working with larger sample and longer period. Besides these the basic problems of qualitative research are: one: the ability of the investigator to see through other peoples' eye and to interpret events from their point of view; two: the relationship between theory and research in the qualitative tradition and three: the extent to which qualitative research deriving from case studies can be generalized. In contrast, the major strengths of quantitative research are reliable data source and logical structure and at last theories determine the research problems a hypothesis derived from general theories.

This study conducts quantitative research method for many reasons: one, nature of research problem of this study, which is measurable and objective rather than subjective; two, this study tests the consequences of theories in practical world; three, quantitative method possesses high internal validity and generalized; fourth, quantitative method is easily applicable for longitudinal study and five quantitative method stimulates further studies and it is easily reliable which eventually helps to verify the finding as well as provides direction for the acceptance, modification or formulation of new theory. Therefore, the logical structure of the quantitative method and the nature of the research problem of this study are to prefer quantitative research method for the proposed research.

There are two ways of collecting data for quantitative research such as primary data collection and secondary data collection. It is worth mentioning that primary data is quite unable to deal with the nature of the research problems and research questions of this thesis. However, while primary data collection procedure considers different dimensions and aspects of the research, this process is problematic for many reasons such as lack of response, unreliable data, different opinion from open end

questionnaire, less consideration of opinion in case of close end questionnaire, difficult to conduct panel study, costly and time consuming. On the other hand, secondary data collection is easier and less time consuming. It is also possible to explore the data for patterns of change and continuity as opposed to static cross sectional analysis. However, secondary data is free from subjectivity. Secondary data can also provide a means of triangulating data. In addition to this, as this research employs panel study, it needs to collect data for the same companies for several years, which is virtually complicated in case of primary data collection. Therefore, these are the reasons to collect data from secondary sources for the proposed study.

Finally in order to conducting study on the emerging markets, this study deals with quantitative research methodology and conducts secondary data collection procedure to collect data from the Dhaka stock exchange listed companies.

5.3. Data and sample:

5.3.1. Sample selection criteria:

All the companies listed in DSE up-to January 01, 1993 have been selected as sample for this research study. The number of listed companies as on that date is 126. No company has been excluded for getting actual results through 100% representation. The listed companies in DSE have been classified into 15 sectors and sector wise sample selection is provided below:

Table 5.2: Sector-wise sample distribution

Name of sector	Number of companies
Banks	12
Investments	07
Engineering	20
Food & Allied	20
Fuel & Power	04
Jute	03
Textile	16
Pharmaceuticals	19
Paper & Packaging	05
Service	02
Cement	01
Tannery	04
Chemical	01
Insurance	04
Miscellaneous	08
Total	126

5.3.2. Sample size and period:

a. **Sample size**: the sample consists of 126 Dhaka Stock Exchange listed companies.

b. **Sample period:** thirteen years period (1993-2005) is considered for this study.

There were 126 companies listed in the DSE up-to 1993 but by increasing that gradually the number was reached to 285 in 2005. So it is observable that the listed companies in DSE are increasing every year because of new initial public offerings (IPO). This study considered all the DSE listed companies for the thirteen years period (1993-2005) as the sample. Though many new companies have been listed, they have not been selected for maintaining consistency in data. Daily, monthly and yearly price data of all sample companies and daily, monthly and yearly all share price index have

been collected for this research for showing the price and return volatility. Along with these, data related to net asset value, earning per share, dividend per share, book value to market value ratio, price-earnings multiple, dividend yield and dividend payout ratio of all sample companies for sample period have been collected for showing the performance of all those sample companies. These are the stock market characteristics that affect stock price and return. For testing the impact of macroeconomic variables on stock price and return data related to gross domestic product, growth rate, per capita income, savings, investment, import, export, foreign exchange reserve, inflation rate, money supply, interest rate and consumption have been collected from secondary source also.

5.3.3. Data sources:

Market data are collected from the Dhaka stock exchange price quotations, published records of the Dhaka stock exchange, the Dhaka stock exchange computer database, Dhaka stock exchange diary, Dhaka stock exchange fact-book, Dhaka stock exchange monthly review, Dhaka stock exchange annual report, Securities and Exchange Commission annual report, Bangladesh Bank and Bangladesh Economic Review.

5.3.4. Problems of data collection:

As the proposed study is conducted on an emerging market, this study collects data from the listed companies of the Dhaka stock exchange. While fully computerized automated trading system established in the Dhaka stock exchange since 1998, the current study is conducting on the Dhaka stock exchange for the period of 1993-2005. This is why in the data collection stage there have been faced a lot of problems. Firstly, most of the data are manually collected because there is little help from the Dhaka stock exchange computerized database. Secondly, there is very poor filing system and the carelessness of the responsible officers of the Dhaka stock exchange in keeping company records. Therefore some company data has been collected from published reports of individual company. The most mentionable problem is that the base for comparing the all share price index was changed in 1997. So it created a major problem for adjusting data between previous indices and current indices. For adjusting and verifying the index, the index data also has been collected from Bangladesh Bank

Library. Finally the reasons mentioned earlier and for many other reasons the process of secondary data collection from emerging market is very much time consuming.

5.4. Choice of data analysis technique:

Secondary data analysis has formed a central component of social science research, being present in the work of Karl Marx, Sidney and Beatrice Webb, Emile Durkheim and so on.

Hakims (1982) defined secondary data analysis as,

"Any further analysis of an existing data set which presents interpretations, conclusions, or knowledge additional to or different forms, those presented in the first report on the inquiry as a whole and its main results"

Some researchers see secondary data analysis as being in some way inferior to the collection of primary data. This may reflect a belief that primary data collection and analysis represents the principal means of adding to the stock of knowledge. Yet often there is considerable scope to generate new finding on the basis of old data. Therefore, secondary data analysis can also form a complement to new research.

Secondary data analysis technique can be used in both descriptive and explanatory researches. The data used may be of both quantitative and qualitative in nature. However Dale et al. (1988) noted that ethnographic data and data generated through unstructured interviews are hard to subject to secondary analysis. It is commonly argued therefore that statistical data generated through surveys or data derived from official records, documentation etc. are far more amenable to secondary data analysis, i.e., the question asked in the survey may have been only partially relevant to the current research, definitions of variables may have been changed over time. The theoretical and analytical objectives of the original research may be diverged significantly from the current research, secondary analysis is cost worthy, time saver, and provide better quality of research. Therefore all of these considerations lead the current research to choose secondary data analysis.

5.5. Available data analysis techniques:

5.5.1. Regression analysis:

1. *Multiple regression equation:* typically the researchers identify the dependent and independent variables and choose the proxies for the variables depending on the previous empirical evidences in this case. Researchers are then run the multiple regression equation based on the selected proxies. In this approach more emphasis is given to the previous studies for identifying variables. Michaels (1961), Gerber (1988), Holder (1998) and Sabena (1999) adapted this approach in their empirical studies.
2. *System equation:* in this approach different stages of least square regression equation run at the same time for the interrelated factors. The researchers run separate regression equations with specific variables for each and every individual factor. This approach is usually used in case of the empirical study for two or more interdependent factors. Jensen considered this approach in his empirical study.
3. *Simple regression equation:* to conduct simple regression analysis in consideration of one dependent variable and another independent variable. From this equation the average value of the dependent variable and the impact of independent variable on dependent variable can be determined and based on this model future result can be forecasted.

5.5.2 Factor analysis:

This method chooses a set of factors that represents the combination of several variables and a set of latent dimensions. Primarily some factors identify by considering different aspects and then each and every factor considers a few variables. However, this approach considers a set of different dimensions at the same time. Alli et al. (1993) considered this approach in their empirical study.

5.5.3. Discriminant analysis:

This method considers that a change in stock price is a discontinuous function of a set of independent variables. In other words, it assumes that a change in the price and return is clearly affected by management's actions and that there is a clear distinction between a change and no change of stock price and return for a particular information.

The statistical methodology employed to test multivariate statistical method is known as multiple discriminant analysis (MDA). The objective of MDA is to classify objects, by a

set of independent variables into one of two or more mutually exclusive and exhaustive categories. The classification is made by comparing the object's discriminant score (zj), which is a linear function of the individual variables, with the 'z' score derived for the entire sample. Given this statistical methodology, the intent of the study is to determine that linear combination of financial characteristics which best discriminates firms which increase their dividend from those which maintain the level of payments. Gillespie (1971) adapted this approach in his empirical study.

5.5.4. Rank correlation:

The rank correlation coefficient is the parson's correlation coefficient based on the ranks of the data. If the original data for each variable has no ties, the data for each variable are first ranked, and then the parson's correlation coefficient between the ranks for two variables is computed. Like the parson's correlation coefficient, the rank correlation range between -1 and +1, where -1 and +1 indicate a perfect linear relationship between the ranks of the two variables. This interpretation therefore is the same except that the relationship between ranks and not values is examined. Michaelsen (1961) considered rank correlation in his empirical study.

5.5.5. Multicollinearity analysis:

This analysis has been conducted for testing the inter-dependency of independent variables. If the independent variables are influenced one by another then there is existency of multicollinearity problem and then the modeling for forecasting future price and return i.e. volatility will not be accurate. By preparing correlation matrix among dependent and independent variables the collinearity can be identified and some of the independent variables are required to be excluded from the model for overcoming this multicollinearity problem and ensuring more accurate and reliable forecasted result. John E. Hanke and Arthur G. Reitsch used this technique in their text Business Forecasting.

5.5.6. Autoregressive model analysis:

Autoregressive models such autoregressive conditional hetroscedasticity (ARCH), autoregressive moving average (ARMA) and autoregressive integrated moving average (ARIMA) can be applied for identifying autocorrelation problem and overcoming this, so that the forecasted results will be more reliable, acceptable and justifiable. When the dependent variable depends to some extent on its previous period's value then this is

termed as autocorrelation problem. For this problem the degree of influence of independent variables on dependent variable will not be measured accurately. John E. Hanke and Arthur G. Reitsch used this technique in their text Business Forecasting. Box Jenkins' applied the following autoregressive models can be applied for testing autocorrelation and this can be used in this study:

$$Y_{t+1} = b_o + b_2 Y_{t-3} + b_3 X_t$$

5.5.7. Measurement of abnormal performance:

5.5.7.1. T-Test Approach:

In this method, abnormal returns are calculated for the event period and then it is tested whether t-statistics of the abnormal returns between the observation period and comparison period are significantly different from zero or not. Abnormal returns are calculated according to the following equation:

$AR_{it} = R_{it} - E(R_{it})$ ..... (1)

Here,

AR_{it} = abnormal return on day't'

R_{it} = daily stock price returns on day't', and

$E(R_{it})$ = expected returns on day't'.

The daily stock price returns are estimated according to the equation below:

$R_{it} = (P_{it} - P_{it-1})/P_{it-1}$ ..... (2)

Here,

R_{it} = share price return on the day't',

P_{it} = share price on day't', and

P_{it-1} = share price on day't-1'.

The expected return is derived by using the well- known market model (Sharp, 1963). Brown and Warner (1985) find this model to be well specified for event studies using daily stock return data.

The expected return is:

$E(R_{it}) = \hat{\alpha} + \hat{\beta} R_{mt}$ ..... (3)

Where, the alpha and the beta hats are the predicted value of constant and predicted value of beta coefficient respectively. The predicted value of constant and the predicted

value of beta coefficient are estimated through ordinary least square regression between individual security return and market return.

5.5.7.2. Cumulative effects of abnormal returns (CAR) approach:

It is calculated the cumulative abnormal returns from the days surrounding the announcement dates by summarizing the abnormal returns over the event time: K= observation days, 0 (event time) and comparison days.

$CAR = \sum AR$

Here, AR= abnormal returns.

Aharony and Swary (1980) and Fehrs et al. (1988) used both of these approaches. However, Abeyratna et al. (1997) used only t- test approach.

5.5.7.3. Buy and hold strategy:

This method is useful to evaluate the performance of firms of dividend initiation and omission before, during, and after the event. The procedures of this approach are:

Calculate the return from a buy and hold strategy:

For each stock, the excess return is defined as the geometrically compounds (buy and hold) return on the stock minus the geometrically compounded return on either (i) the equally weighted index including dividends, (ii) the appropriate market capitalization decline, (iii) the equally weighted market index adjusted for the beta of each stock, or (iv) a matching firm in the same industry that is closest in the market capitalization.

$$ER_j\ (a\ \&\ b) = \prod (1+R_{jt}) - \prod (1+MR_t)$$

Where ER_j (a & b) = excess return from firm 'j' from time period 'a' to 'b'. For the three days event period, the time period (a and b is trading days t = -1, 0, +1. for the monthly periods before or after the event, the returns are calculated assuming 21 trading days for each month. That is, the 12 month return is actually a 252 trading days (12*21) return. R_{jt} = raw return for observation firm 'j' on the day 't'; MR_t = return on the equally weighted or beta adjusted market index, the market capitalization decline, or the industry and size matched firm on day 't'.

The average excess returns for each period are then

$$\bar{E}R = 1/N * \sum ER_j$$

Compare those returns to benchmark portfolio returns:

Michaely et al. (1995) adapted buy and hold strategy and used CRSP equally weighted excess returns as the benchmark.

5.5.7.4. Comparison period return approach (CPRA):

This method is applied to test the statistically significant of security price movement around dividend changes. Using monthly returns, Brown and Warner (1980) have shown the CPRA to be at least as powerful as market-adjusted approaches in detecting significant price movements for uncluttered events. Masulis (1980a) noted that this conclusion is in even stronger when using daily returns due to the very low and often insignificant relationship of the market when applied on daily basis.

Mean daily returns around and on the event date are computed by averaging security returns by day. The average value of return distributions for the event day and surrounding days are compared to ascertain the market's perception of dividend changes.

CPRA Process:

Given that the return generating process is stochastic in nature, a security's return (r_{it}) over time can be specified as:

$r_{it} = \mu_{it} + \acute{\varepsilon}_{it}$

The expected return μ_{it} of a security is a function of a market –determined pricing process (in the spirit of the capital asset pricing model) and of a security's return characteristics. The stochastic error term ($\acute{\varepsilon}_{it}$), which has an empirical value of zero and is serially correlated, reflects both market developments and specific security price influences.

If returns are stationary over time, the impact (if any) of new information on security price may be discovered through an examination of $\acute{\varepsilon}_{it}$'s to determine if the $\acute{\varepsilon}_{it}$'s around an event date are nonzero, a test is conducted to determine if the mean daily return of the event period (observation period) is statistically different from the mean daily return of some other representative time period (the comparison period). The mean daily return for the comparison period actually an estimate of μ_{it}, the expected daily return in the

equation. To minimize error in the estimation of μ_{it}, portfolio of securities is formed in event time around the announcement dates. If security returns are independent and stationary over time with finite variances, portfolio daily returns in large sample approach normal distributions. Therefore, a student't' for the difference in population means can be employed to test for equality of event period and comparison period mean returns.

T- Statistics between comparison and observed period to test whether the returns (the mean daily returns (MDRs) and the mean parentage of daily returns greater than zero (MPDR) for the days surrounding unexpected dividend increase (decrease announcements) are significantly different from zero or not. Wool ridge (1983) used this method in his empirical study.

5.5.8. Mean adjusted returns method:

Eddy and Seifert (1992), and Dhillon and Johnson (1994) use the mean-adjusted return technique to estimate abnormal price reaction to dividend or earnings announcements. Brown and Warner (1985) find that when announcements are unclustered, this technique works better than other procedures. This technique essentially compares the average returns of the same securities during a comparison period. Eddy and Seifert (1992) used standardized returns, Brown and Warner (1985) suggest using standardized returns instead of raw returns because the distribution becomes more like a t- distribution, and the power of the tests should be greater.

5.6. Problems of secondary data analysis:

In the data analysis stage, this study faced few problems. Basically those problems arise for many reasons including : (i) abnormal market fluctuation in 1996, (ii) both active and inactive are listed in the Dhaka stock exchange, (iii) different sizes of companies are listed in Dhaka stock exchange, i.e., some companies are big and some are very small, (iv) big difference in the payment of dividend, i.e., some companies pay very higher rate of dividends e.g., 200%-300% or even more and some others pay very lower rate of dividends e.g., 5% or even less. In the data analysis stage we mainly faced the outlier problems. It is found that in some cases outliers made a real difference. So, it is identified the cases where outliers played a vital role and it is simply excluded that

particular case from the analysis in bringing normality in the variable. For example, when it is conducted descriptive analysis for the dividend payout ratio (dividend/operating income) with all companies then we got mean =0.8922 and σ =15.0464, but we found three outliers. In some cases, it is required to make adjustment of data otherwise there is abnormal result. Since there is no normal trend in price of companies listed in Dhaka Stock Exchange, the model provides unusual results. Besides these, in Dhaka Stock Exchange, during last few decades, index calculation method has been changed several times that made a serious problem for measuring performance of the market based on changed base of all share price index.

5.7. Proposed model for the study:

From the above discussions it reveals that for this proposed study regression model would be more appropriate. Because the main objective of this research is to measure the significant impact of some selected independent variables on specified dependent variable. Since the study concerns with identification of both stock market characteristics and macroeconomic variables influencing stock price and return and estimation of future forecasted results several models are proposed. Different models will be applicable for different types of data series and for different purposes. The appropriate model for appropriate data is proposed in the following section:

A: Stock market characteristics viewpoint:

Though price and return are supposed to be affected by many factors, all the factors are not equally significant for changing price and return. By conducting multiple regression analysis in several times in consideration of price as dependent variable and some other selected independent variables (stock market characteristics i.e. microeconomic factors), the model finally formulated can be symbolized as follows:

$$P_t = \alpha_t + \beta_{t1}\chi_{t1} + \beta_{t2}\chi_{t2} + \beta_{t3}\chi_{t3} + \beta_{t4}\chi_{t4} + \beta_{t5}\chi_{t5} + \varepsilon_t$$

Where, P_t = Price at time t; α_t = Intercept/Constant price; β_{t1} = Beta coefficient of χ_{t1} i.e. number of listed companies; β_{t2} = Beta coefficient of χ_{t2} i.e. number of listed securities; β_{t3} = Beta coefficient of χ_{t3} i.e. number of initial public offerings; β_{t4} = Beta coefficient of χ_{t4} i.e. earnings per share; β_{t5} = Beta coefficient of χ_{t5} i.e. dividend per share and ε_t = Residual or disturbance term.

The model for estimating and forecasting return based on selected stock market characteristics can be symbolized as follows:

$$R_t = \alpha_t + \beta_{t1}\chi_{t1} + \beta_{t2}\chi_{t2} + \varepsilon_t$$

Where, R_t = Rate of return at time t; α_t = Intercept/Constant rate of return; β_{t1} = Beta coefficient of χ_{t1} i.e. book value per share; β_{t2} = Beta coefficient of χ_{t2} i.e. price earnings multiple and ε_t = Residual or disturbance term.

B: Macroeconomic variables' viewpoint

Though price and return are supposed to be affected by many macroeconomic factors, all the factors are not equally significant for changing price and return. By conducting multiple regression analysis on monthly data in several times in consideration of price as dependent variable and some other selected independent variables (macroeconomic factors), the model finally formulated can be symbolized as follows:

$$Y_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X3 + \beta_4 X4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon_t$$

Where, Y_t = Price at time t; β_0 = Intercept/Constant price; β_t = Beta coefficient of X_t i.e. growth rate; β_2 = Beta coefficient of X_2 i.e. import; β_3 = Beta coefficient of X_3 i.e. export; β_4= Beta coefficient of X_4 i.e. foreign exchange reserve; β_5 = Beta coefficient of X_5 i.e. rate of inflation; β_6 = Beta coefficient of X_6 i.e. amount of money supply; $\beta 7$ = Beta coefficient of X_7 i.e. advance interest rate and ε_t = Residual or disturbance term.

Using the annual macroeconomic variables the proposed model for price is:

$$P_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X3 + \varepsilon_t$$

Where, P_t = Price at time t; β_0 = Intercept/Constant price; β_1 = Beta coefficient of X_1 i.e. rate of inflation; β_2 = Beta coefficient of X_2 i.e. deposit interest rate; β_3 = Beta coefficient of X_3 i.e. consumption level and ε_t = Residual or disturbance term.

The model for estimating and forecasting return based on selected macroeconomic variables by using monthly data can be symbolized as follows:

$$R_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon_t$$

Where, R_t = Rate of return at time t; β_0 = Intercept/Constant rate of return; β_1 = Beta coefficient of X_1 i.e. amount of money supply; β_2 = Beta coefficient of X_2 i.e. deposit interest rate and ε_t = Residual or disturbance term.

Using the annual macroeconomic variables the proposed model for return is:

$$R_t = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X3 + \varepsilon_t$$

Where, R_t = Rate of return at time t; β_0 = Intercept/Constant rate of return; β_1 = Beta coefficient of X_1 i.e. growth rate; β_2 = Beta coefficient of X_2 i.e. rate of inflation; β_3 = Beta coefficient of X_3 i.e. deposit interest rate and ε_t = Residual or disturbance term.

5.8. Volatility forecasting methods based on past data:

5.8.1. Historical mean:

Extrapolation of the historical mean in volatility provides perhaps the most obvious means of forecasting future volatility. Moreover if the distribution of volatility has a stationary mean all variation in estimated volatility is attributable to measurement error and the historical mean , $\bar{\sigma}$, computed as the unweighted average of volatility observed in-sample, then gives the optimal forecast of volatility , h, for all future periods:

$$h_{t+1} = \bar{\sigma}^2 = \frac{1}{T}\sum_{j=1}^{T}\sigma_j^2; \quad t = T, T+1, \ldots\ldots\ldots, T+\tau-1$$

Forecasts based on this mean also provide a benchmark for the comparative evaluation of the alternative forecasting models outlined below. In addition to this in-sample historical mean, it is also considered the recursive assessment of the historical mean, iteratively updated with each incremental observation on volatility over the out of sample period:

$$h_{t+1} = \bar{\sigma}_t^2 = \frac{1}{t}\sum_{j=1}^{T}\sigma_j^2; \quad t = T, T+1, \ldots\ldots\ldots, T+\tau-1$$

Such that the mean of historic volatility and forecasting of future volatility at any point in time during the out of sample period is based on all information on actual volatility available at that point in time.

5.8.2. Moving average:

Under the moving average method volatility is forecasted by an unweighted average of past observed volatilities over a particular historical time interval of fixed length.

$$h_{t+1} = \bar{\sigma}^2_{t,T} = \frac{1}{T}\sum_{j=T-T}^{T}\sigma_j^2; t = T, T+1, \ldots\ldots\ldots, T+\tau-1$$

Where, T is the moving average period or 'rolling window'. The choice of this interval is essentially arbitrary and two lengths are considered here for each frequency. These arbitrary choices are ten years and five years for monthly data, two and one half years and one-and-one-quarter years for weekly data, and six months and three months for daily data, corresponding to T= 120 and T=60 data points for the longer and shorter window lengths in each case.

5.8.3. Random walk:

The preceding models presume reversion to a stable or gradually shifting trend in volatility. However if volatility fluctuates randomly the optimal forecast of next period's volatility is simply current actual volatility:

$$h_{t+1} = \bar{\sigma}_t^2; t = T, T+1, \ldots\ldots\ldots, T+\tau-1$$

This random walk model thus suggests that the optimal forecast of volatility is for no change since the last true observation. This model also provides us with an alternative benchmark for appraising the relative forecasting performance of methods considered here, being a standard comparative method in econometric forecast appraisal.

5.8.4. Exponential smoothing:

Exponentially smoothing is a procedure for continually revising an estimate in the light of more recent experiences this method is based on averaging (smoothing) past values of a series in a decreasing (exponential) manner. These observations are weighted with more weight being given to the more recent observations. The weighted used are A for the most recent observation, A (1-A) for the next most recent, A $(1\text{-}A)^2$ for the next and so forth. This weighting system can be written as

$$F_{T+1} = AX_T + (1-A)F_T$$

Where

F_{T+1}= forecasted value for next period

A= smoothing constant ($0 \leq A \leq 1$)

X_T= actual value of series in period T

F_T= average experience of series smoothed to period T or forecasted value for last period. Analysis on the real prices of different years at different smoothing constant level provides relatively better forecasting. The value of A ranged 0.1 to 0.9. At A=0.9 level the forecasting error was minimum (1.95).

5.8.5. Exponentially weighted moving average (EWMA):

The exponentially weighted moving average model is similar to the exponential smoothing model, but where past observed volatility is replaced with a moving average forecast through the following equation:

$$h_{t+1} = \psi_T h_t + (1-\psi_T)\frac{1}{T}\sum_{j=T-T}^{1}\sigma_j^2; t = T, T+1, ..., T+\tau-1$$

with T specified as for the longer of two horizons considered for each frequency in the moving average model above.

5.8.6. Winter model:

Winters's three parameters linear and seasonal exponential smoothing model is an extension of Holt's model that can reduce forecasting error. In order to forecast the price of the upcoming years Winter's additive model can be an effective tool since it considers both seasonality and trend of the variables. The four equations used in Winter's model are as follows:

1. Update the exponentially smoothed series

$$F_T = A\frac{X_T}{S_{T-P}} + (1-A)(F_{T-1} + T_{T-1})$$

2. Update the seasonality estimate

$$S_T = B\frac{X_T}{F_T} + (1-B)S_{T-P}$$

3. Update the trend estimate

$$T_T = C(F_T - F_{T-1}) + (1-C)T_{T-1}$$

4. Forecast P periods in the future

$$\hat{F}_{T+P} = (F_T + PT_T)S_T$$

Where,

F_T= exponentially smoothed value in period T

A= smoothing constant

X_T= actual value of series

F_{T-1}= average experience of series smoothed to period T-1

B= smoothing constant for seasonality estimate

S_T= seasonality estimate

S_{T-P}= average experience of seasonality estimated smoothed to period T-P

C= smoothing constant for trend estimate

T_T= trend estimate

T_{T-1}=average experience of trend estimate smoothed to period T-1

P= number of seasons per year (monthly or quarterly)

$\hat{F}_{T+P}$= forecast for P periods into future

5.8.7. Simple (mean) regression:

The simple regression model provides one-step-ahead forecasts generated from the application of an in-sample estimated ordinary least squares of observed actual volatility upon immediately preceding actual volatility to out of sample data:

$$h_{t+1} = \gamma_T + \delta_T \sigma^2_{t-1}; t = T, T+1, ..., T+\tau-1$$

Following Dimson and Marsh (1990), again assuming the stationary of volatility over the longer term, if such forecast are to be unbiased then the simple regression implicitly forecasts volatility as a weighted sum of recent volatility and long run mean volatility

and such that volatility will regress from its most recent level, σ_{t-1}^2 towards its long run mean $\bar{h}$, with δ determining the speed of regression towards that mean.

5.8.8. Generalized autoregressive conditional heteroscedasticity (GARCH):

The GARCH model of Engle (1982) and Bollerslev (1986) requires joint estimation of the conditional mean and variance process, the former being represented by an autoregressive process for stock index returns. On the assumption that the resulting conditional mean stochastic error is normally distributed with zero mean and time varying conditional variance quantifying volatility, out-of-sample forecasts of volatility are generated by the GARCH (p,q) model.

$$\phi'_{\varphi,T}(L)r_t = \mu'_T + \varepsilon_t;$$
$$\phi'_{\varphi,T}(L) = 1 - \phi'_{1,T}L - \cdots\cdots - \phi_{\varphi,T};t = 1,2,\ldots\ldots,T+\tau$$
$$\varepsilon_t \sim N(0,h_t)$$
$$h_{t+1} = \omega_T + \sum_{i=1}^{q}\alpha_{i,T}\varepsilon^2_{t-i+1} + \sum_{i=1}^{p}\beta_{i,T}h_{t-i+1};t = T,T+1,\ldots\ldots T+\tau-1$$

Where $\omega > 0, \alpha_i, \beta_i \geq 0$ and $\sum_i \alpha_i + \sum_i \beta_i < 1$, the latter sum quantifying the persistence of shocks to volatility. The GARCH (1,1) model, for example , thus generates one step-ahead forecast of volatility, h_{t+1} as a weighted average of the constant long run or average variance, ω, the previously forecast variance for the current period , h_t , and current volatility reflecting squared 'news' about the index return, . In particular volatility forecasts are increased following a large positive or negative index return, 'ε_t^2' the GARCH specification thus capturing the well-documented volatility clustering evident in financial returns data.

5.8.9. Threshold-GARCH (TGARCH):

The GARCH model, although non-linear in the conditional mean error term, ε_t postulates a linear relationship between forecast volatility, previous forecasts of volatility and current and lagged measured volatility in response to news. However it has been observed that positive and negative shocks of equal magnitude have a differential impact upon stock price volatility, which may be attributable to a 'leverage' effect (Black,

1976). Further stock market returns series have been noted to display significant negative skewness, possible due to the fact that market crashes are greater in absolute size and occur more frequently and more quickly than booms (Franses and van Dijk, 1996). One model that is able to capture these features is the TGARCH model (Glosten et al., 1993) which, for a first order threshold, is expressed as:

$$h_{t+1} = \omega_T + \sum_{i=1}^{q} \alpha_{i,T} \varepsilon_{t-i+1}^2 + \xi_T I_t \varepsilon_t^2 + \sum_{i=1}^{p} \beta_{i,T} h_{t-i+1}$$
$$t = T, T+1, \ldots\ldots, T+\tau-1$$

Where , $I_t = 1$ if $\varepsilon_t < 0$, and $I_t = 0$ if $\varepsilon_t > 0$.Thus in the TGARCH (1,1) case , for example, positive news has an impact of α_1 on volatility while negative news has an impact of $\alpha_1 + \xi$, positive (negative) news therefore having the greater impact on subsequent volatility for $\xi < 0 (\xi > 0)$, while shock persistence is quantified by $\sum_i \alpha_i + \sum_i \beta_i + (\xi / 2)$. .

5.8.10. Exponential-GARCH (EGARCH):

The EGARCH model (Nelson, 1991) provides an alternative asymmetric model, the conditional variance being expressed as an asymmetric function of past errors as follows:

$$\log(h_{t+1}) = \omega_T + \sum_{i=1}^{q} \alpha_{i,T} \left(\xi_{1,T} \frac{|\varepsilon_{t-i+1}|}{\sqrt{h_{t-i+1}}} + \xi_{2,T} \frac{\varepsilon_{t-i+1}}{\sqrt{h_{t-i+1}}} \right) + \sum_{i=1}^{p} \beta_{i,T} \log(h_{t-i+1})$$

$t = T, \ldots\ldots T+\tau-1$ where, the ξ_1 coefficient captures the volatility clustering effect noted above and the coefficient measures the asymmetric effect, which if negative indicates that negative shock have a greater impact upon conditional volatility than positive shock of equal magnitude. Additionally the use of logs allows the parameters α_i and β_i to be negative without the conditional variance becoming negative, while the persistence of shock to conditional variance is given by $\sum_i \beta_i$.

5.8.11. Component –GARCH (CGARCH):

The CGARCH model of Engle and Lee (1993) attempt to separate long run and short run volatility effects in a similar manner to the Beveridge-Nelson (1981) decomposition of conditional mean ARMA model for economic time series. Thus while the GARCH model and its asymmetric TGARCH and EGARCH extensions exhibit mean reversion to a time varying level. The GARCH specification is:

$$h_{t+1} = \omega_{t+1} + \alpha_1\left(\varepsilon_t^2 - \omega_t\right) + \beta_1\left(h_t - \omega_t\right)$$
$$t = T, T+1, \ldots\ldots, T+\tau-1$$
$$\omega_{t+1} = \omega + \rho\omega_t + \xi\left(\varepsilon_t^2 - h_t\right)$$

Where ω_t represents a time varying trend or permanent component in volatility which is integrated if $\rho = 1$. The volatility prediction error $(\omega_{t-1}^2 - h_{t-1})$ serves as the driving for the time dependent movement of the trend and the difference between the conditional variance and its trend $(h_t - q_t)$, defines the transitory component of the conditional variance. The transitory component then converges to zero powers of $(\alpha + \beta)$ while the long run component converges on with powers of ρ.

5.8.12. Recursively estimated models:

In addition to recursive appraisal of the historical mean we also consider forecasting generated by recursive variants of the above models which involve parameters estimated using in –sample data. That is those model involving parameters with a T subscript. These alternative recursively generated one-step-ahead forecasts are based on re-estimation of the underlying parameters at each data point over the out-of-sample period, that re-estimation utilizing all information available at that point in time. Thus while not specified in full, the set of parameters

$$\Omega_T = \left(\phi_T, \psi_T, \gamma_T, \delta_T, \theta_{t,T}, \mu_T, \omega_T, \alpha_{t,T}, \beta_{t,T}, \xi_T, \zeta_{1,T}, \zeta_{2,T}, \rho_T\right)$$

Here, $\Omega_t = \left(\phi_t, \psi_t, \ldots\ldots\ldots, \rho_t\right)$ for $t = T, \ldots\ldots T+\tau-1$.

Out of all above models for identifying the determinants of price and return from both stock market characteristics and macroeconomic variables both simple and multiple regression techniques have been applied. For testing the validity of the model test of

muliticollinearity, test of autocorrelation, test of heteroscedasticity, variance-ratio test and test of normality have been applied. In case of measuring present volatility and forecasting future volatility, historical mean, moving average, random walk, exponential smoothing, exponentially weighted moving average, simple regression, autoregressive moving average, autoregressive integrated moving average, Winters' model and Campell-Shieller mean reversion model have been used. In this study information related to stock market characteristics have taken as average of 126 sample companies and the annual value of all predictors have been considered as monthly data. In case of most of the empirical studies the impact of dividend has been analyzed from the view point of cum-dividend and ex-dividend, but in this study it is not considered, rather the average dividend payment of all sample companies for a particular year has been taken as independent variable.

5.9. Conclusion:

The purpose of this chapter is to explain the general research methodology considered and the suitability of choosing a specific method for this research. The first section of this chapter discusses the alternative research methods and justifies the rationality of choosing the quantitative research method for this study. The second section of this chapter provides an explanation of the data and sample including sample selection criteria and secondary data collection procedure. This section, moreover, provides the data collection procedure for each and every area of research. At the end of this section, the major problem faced for collecting secondary data for this study are identified. The third section provides a brief outline of the secondary data analysis techniques for each of the three areas of research and justification of choosing a specific type of technique to analyze the collected data for handling the research problem. The fourth section provides different volatility forecasting methods of price and return. This chapter also describes the typical problems faced by the researchers to deal with emerging market secondary data including secondary data analysis. Finally this chapter contains the different methods will be applied for quantitative research, methods for testing validity of the proposed regression model and volatility forecasting techniques based on nature of availability of data.

CHAPTER - SIX

EMPIRICAL EVIDENCE FROM DETERMINANTS OF STOCK PRICE AND RETURN OF DHAKA STOCK EXCHANGE

6.1. Introduction

Stock price of a market is not stable rather always changeable. The rate of change in some markets may be low and in some other markets may be high. Factors behind this fluctuation are also different of one market from another market. The purposes of this chapter are to identify the major factors influencing stock price as well as return, to measure the level of their significance and to forecast about price and return of an emerging market (Dhaka Stock Exchange). This chapter will be divided into major two parts: one- stock market characteristics affecting stock price and return and two- macroeconomic variables influencing stock price and return. For identifying the most important determinants of stock price both simple and multiple regression and correlation model will be applied for each part on stock market characteristics and macroeconomic variables.

6.2. Determinants of Stock Price and Return

6.2.1. Stock market characteristics

From the stock market characteristics view point many factors are supposed to influence stock price and return such as number of listed companies, number of securities, number of initial public offerings, issued capital, turnover (volume of trade in mil. Tk.), number of shares issued (supply of shares), number of shares traded, earnings per share, number of companies paid dividend, percentage of companies paid dividend, dividend yield, dividend payout ratio, dividend per share, book value per share (net asset value per share), price-earning multiple, market to book value ratio and others. Information related to these variables is presented in the following table 6.1:

Table – 6.1: Summary of stock market characteristics of DSE

Year	# Listed companies	Listed securities (mil.)	Issued capital (mil. Tk.)	Market capitalization (mil. Tk.)	Turnover (mil.Tk.)	No. of shares issued	No. of shares traded	No. of IPOs	DSE Index	No.of companies paid dividend
1993	132	195.06	8201.50	18098.7	403.61	195085872	4373143	4	391.77	63
1994	150	241.5	11673.80	41770.7	2442.87	240156945	11560837	26	845.65	62
1995	175	341.78	19438.05	56518.14	4660.80	339855004	25947042	24	834.73	87
1996	191	397.43	23052.40	168106.0	3150.00	394841035	103772874	24	2300.15	71
1997	209	510.48	28159.80	71255.54	35411.53	512103096	119313228	12	756.78	72
1998	228	504.16	26813.43	50254.02	34560.00	501066990	1015297101	8	540.22	73
1999	232	260.55	27229.89	45483.38	38270.00	557107349	733817279	12	487.77	79
2000	241	640.28	29916.00	62924.00	40270.00	640276000	949194473	8	642.68	86
2001	249	850.64	32215.00	63769.00	39870.00	777756000	1104402160	11	829.61	197
2002	260	1026.72	34364.00	71261.75	34980.00	1026720000	1299440616	8	848.41	211
2003	267	1151.58	45370.00	98587.00	19470.00	1077916000	612739156	14	967.88	132
2004	273	1188.53	48996.00	224923.00	51760.00	1113924000	1538817583	3	1971.31	193
2005	285	1384.73	55851.00	234211.73	64860.00	1244142000	5175462568	17	1677.35	79

Source: Annual report, Monthly review, Library and Computer data base of DSE (1993-2005)

Table 6.1: continued

Year	Price	Return (%)	Book value per share	EPS	DPS	P/E ratio	DY (%)	MV/BV ratio
1993	128.18	0	86.3235	-9.121	10.5322	9.655	7.5526	2.3291
1994	229.26	79.2576	51.2188	3.3704	9.822	25.4169	3.1739	1.8792
1995	348.67	52.4906	101.0519	6.8497	10.6632	34.1928	3.3904	1.6992
1996	766.52	120.3627	63.4428	10.9799	10.1712	129.8742	2.1353	5.5004
1997	362.12	-51.8834	51.8476	8.3998	10.5922	9.8382	2.6879	3.1818
1998	163.35	-54.3051	163.8522	14.8615	11.4214	13.4398	4.929	4.322
1999	150.49	-7.49	53.1408	7.6859	11.0738	12.312	4.4321	0.6976
2000	238.19	58.6216	111.3842	12.7286	19.196	5.9657	3.6658	0.4953
2001	273.16	16.5047	149.7105	15.7443	22.7243	9.421	4.8551	0.8349
2002	187.29	-30.8494	156.6247	21.9342	19.6353	23.3538	4.8964	2.8881
2003	278.36	49.2187	112.6703	14.6779	19.7198	12.7064	4.0778	1.9273
2004	483.92	74.2986	123.7298	10.3926	17.6385	22.4489	5.3434	3.9137
2005	442.63	-7.7293	125.7453	20.8973	29.2377	24.7285	5.3884	-0.2172

Source: Annual report, Monthly review, Library and Computer data base of DSE (1993-2005)

a) Simple regression and correlation analysis

This analysis is conducted by considering the price, return of selected stocks and all share price index as separate dependent variable and number of listed companies, number of listed securities, number of initial public offerings, issued capital, turnover, number of shares issued (supply of shares), number of shares traded, number of companies paid dividend, percentage of companies paid dividend, dividend yield, dividend payout ratio, earnings per share, dividend per share, book value per share (net asset value per share), price-earning multiple, market to book value ratio as separate independent variables. The analytical results are presented in the following table 6.2:

Table – 6.2: Results of simple regression equation on average share price of some important stock market characteristics

Independent variables	Intercept	Regression coefficient	r^2	Correlation coefficient	Probability value of t	Signifi-cant at t=0.05)	Adjusted r^2	Standard error	F-value	Significant at F=0.05)
listed companies	217.38	0.4240	0.0136	0.1165	0.0164	Yes	-0.0761	182.036	0.7047	Not
initial public offerings	184.36	9.6813	0.1749	0.4182	0.0102	Yes	0.0999	166.4821	0.1549	Not
issued capital	202.08	0.0036	0.0819	0.2862	0.0003	Yes	-0.0016	175.6182	0.3413	Not
market capitalization	138.49	0.0019	0.5591	0.7477	0.0700	Not	0.5189	121.7058	0.0032	Yes
turnover	313.23	-0.00005	0.00004	0.0063	0.003	yes	-0.0909	183.28	0.9837	Not
shares issued	261.88	0.00000	0.0228	0.1511	0.0248	Yes	-0.0660	181.1806	0.6223	Not
shares traded	293.00	0.00000	0.0224	0.1496	0.0102	Yes	-0.0665	181.2216	0.6257	Not
Companies paid dividend	219.53	0.4146	0.0129	0.1135	0.3989	Not	-0.0769	182.0994	0.7120	Not
dividend per share	284.46	1.7497	0.0038	0.0619	0.0344	Yes	-0.0867	182.9317	0.8407	Not
% of companies dividend paid	353.20	-0.8689	0.0081	0.0901	0.0048	Yes	-0.0821	182.5389	0.7698	Not
dividend yield	575.10	-60.5743	0.2356	0.4854	0.0370	Yes	0.1662	160.2402	0.0926	Not
dividend payout ratio	317.35	-8.6723	0.0004	0.0191	0.0007	Yes	-0.0905	183.2501	0.9506	Yes
earnings per share	264.46	4.4061	0.0404	0.2010	0.0792	Not	-0.0468	179.5437	0.5103	Not
book value per share	403.21	-0.8807	0.0409	0.2023	0.3959	Not	-0.0463	179.4955	0.5075	Not
price-earning multiple	197.85	4.4398	0.6723	0.8199	0.1228	Not	0.6425	104.9198	0.0006	Yes
market to book value ratio	205.12	46.6959	0.1949	0.4415	0.0354	Yes	0.1217	164.4559	0.1309	Not

Table – 6.3: Results of simple regression equation on all share price index of some important stock market characteristics:

Independent variables	Intercept	Regression coefficient	r^2	Correlation coefficient	Probability value of t	Significant at t=0.05)	Adjusted R square	Standard error	F-value	Significant at F=0.05
listed companies	192.18	3.6639	0.0885	0.2976	0.0164	Yes	0.0057	591.7887	0.3234	Not
initial public offerings	724.21	21.5176	0.0755	0.2759	0.0102	Yes	-0.0085	595.5984	0.3634	Not
issued capital	392.68	0.0204	0.2250	0.4744	0.0003	Yes	0.1546	545.6907	0.1015	Not
market capitalization	304.89	0.0076	0.8036	0.8964	0.0700	Not	0.7858	274.6973	3.3347	Not
turnover	879.15	0.0045	0.0245	0.1565	0.003	yes	-0.0642	612.2358	0.6096	Not
# shares issued	575.77	0.0000	0.1596	0.3868	0.0248	Yes	0.0722	571.6344	0.1917	Not
# shares traded	859.14	0.0000	0.1227	0.3503	0.0102	Yes	0.0429	580.6056	0.2407	Not
companies paid dividend	806.23	1.8599	0.0303	0.1739	0.3989	Not	-0.0579	610.4242	0.5698	Not
dividend per share	284.46	1.7497	.00384	.06194	0.0344	Yes	-0.0867	182.932	0.8407	Not
% of companies dividend paid	317.808	-.0565	.00032	.01786	0.0048	Yes	-.09056	183.254	0.9538	Not
dividend yield	575.103	-60.5747	0.2356	0.4854	0.0370	Yes	0.1662	160.2399	0.0926	Not
dividend payout ratio	317.346	-8.6697	.00037	0.0191	0.0007	Yes	-0.0905	183.2502	0.9506	Not
earnings per share	762.23	22.8503	0.0949	0.3082	0.0792	Not	0.0127	589.7028	0.3056	Not
book value per share	1044.08	-0.3545	0.0006	0.0241	0.3959	Not	-0.0903	619.6949	0.9378	Not
price-earning multiple	667.52	13.2490	0.5234	0.7235	0.1228	Not	0.4800	427.9278	0.0052	Yes
market to book value ratio	205.915	46.6959	0.1949	0.4415	0.0354	Yes	0.1217	164.4559	0.1309	Not

Table – 6.4: Results of simple regression equation on stock returns of some important stock market characteristics:

Independent variables	Intercept	Regression coefficient	r^2	Correlation coefficient	Probability value of t	Significant at t=0.05	Adjusted R square	Standard error	F-value	Significant at F=0.05
listed companies	69.747	-0.21031	0.0352	0.1876	0.0164	Yes	-0.053	55.4298	0.5393	Not
initial public offerings	-21.29	3.3640	0.2228	0.4720	0.0102	Yes	0.1522	49.7497	0.1034	Not
issued capital	32.4372	-0.00031	0.0065	0.0803	0.0003	Yes	-0.0839	56.2497	0.7942	Not
market capitalization	0.5604	0.00024	0.0986	0.3141	0.0700	Not	0.0167	53.5769	0.2960	Not
turnover	53.2436	-0.0011	0.1652	0.4064	0.003	yes	0.0893	51.5619	0.1682	Not
shares issued	34.7755	-1.7853	0.0135	0.1163	0.0248	Yes	-0.0761	56.0490	0.7051	Not
shares traded	31.8543	-9.1072	0.0534	0.2310	0.0102	Yes	-0.0327	54.9058	0.4477	Not
companies paid dividend	24.470	-0.0139	0.0002	0.0143	0.3989	Not	-0.091	56.4263	0.9629	Not
dividend per share	36.0301	-0.8393	0.0093	0.0965	0.0344	Yes	-0.0808	56.1688	0.7538	Not
% of companies dividend paid	14.47	0.1779	0.0036	0.0597	0.0048	Yes	-0.872	56.3314	0.8463	Not
dividend yield	87.407	-14.8208	0.1488	0.3857	0.0370	Yes	0.0714	52.0644	0.1929	Not
dividend payout ratio	47.989	-38.4651	0.0758	0.2753	0.0007	Yes	-0.008	54.2509	0.3626	Not
earnings per share	35.382	-1.1583	0.0294	0.1716	0.0792	Not	-0.0588	55.5949	0.5751	Not
book value per share	65.958	-0.4308	0.0953	0.3087	0.3959	Not	0.0130	53.6763	0.3048	Not
price-earning multiple	-2.15	0.9792	0.3449	0.5874	0.1228	Not	0.2854	45.6721	0.0348	Yes
market to book value ratio	11.989	4.8431	0.0221	0.1487	0.0354	Yes	-0.068	55.8047	0.6278	Not

b) Multiple Regression and Correlation Analysis

I. Impact of stock market characteristics on price

PRICE = 897 - 1.43 LSTC + 0.232 LSTS + 0.00194 MCAP - 9.14 IPOS + 1.08 BVPS - 3.76 EPS - 18.1 DPS + 3.72 PERTO- 73.9 DYLD- 51.6 MBRTO + 109 DPR+109DPR

Here:

LSTC= number of listed companies,
LSTS = number of listed securities (mil.),
MCAP= market capitalization (mil.Tk.),
IPOS= number of initial public offerings,
BVPS = book value per share,
EPS = earnings per share,
DPS = dividend per share,
PERTO = price-earnings ratio
DYLD = dividend yield,
MBRTO = market to book or net asset value ratio
DPR = dividend payout ratio.

This multiple regression and correlation analysis has been performed by considering the average price of 126 sample companies as dependent variable and number of listed companies, number of listed securities, number of initial public offerings, issued capital, turnover, number of shares issued (supply of shares), number of shares traded, number of companies paid dividend, percentage of dividend paid, dividend yield, dividend payout ratio, earnings per share, dividend per share, book value per share (net asset value per share), price-earning multiple, market to book value ratio as separate independent variable. The above regression model has been derived from annual data by applying eviews4 software. The software automatically excludes turnover, number of shares issued, number of shares traded, number of companies paid dividend, percentage of companies paid dividend and price-earnings multiple etc.

Predictor	Coef	SE Coef	T	P
Constant	896.8	586.9	1.53	0.369
list. Se	-1.433	1.783	-0.80	0.569
Listed s	0.2321	0.2543	0.91	0.529
Market c	0.0019	0.00054	3.60	0.173
IPOs	-9.136	7.406	-1.23	0.434
Book val	1.0786	0.8403	1.28	0.421
EPS	-3.758	8.903	-0.42	0.746
DPS	-18.07	21.70	-0.83	0.558
P/E rati	3.719	1.481	2.51	0.241
DY(%)	-73.95	22.15	-3.34	0.185
MV/BV ra	-51.57	53.01	-0.97	0.509
DPR(%)	109.49	53.26	2.06	0.288

S = 45.21 R-Sq = 99.4% R-Sq(adj) = 93.4%

Analysis of Variance

Source	DF	SS	MS	F	Signi.F
Regression	11	367478	33407	16.35	0.191
Residual Error	1	2044	2044		
Total	12	369522			

Durbin-Watson statistic = 2.59

Lower limit of Durbin-Watson statistic = 0.56

Upper limit of Durbin-Watson statistic = 2.21

According to DW statistics there is no autocorrelation between current period's price and lag period's price i.e. current period's price is independent from its previous periods' price. This multiple regression analysis has been conducted based on last 13 years annual data. The results indicate that none of the independent variable is significant for dependent variable i.e. though the price of shares is influenced by different stock market characteristics yet their influence is insignificant. Also the result is not statistically significant. In order to remove autocorrelation problem the monthly data has been used because there is only 13 years data where Durbin-Watson Statistics will not be appropriate. The value of coefficient of determination, r^2 = 99.4%, indicates/interpretes that out of 100% change in dependent variable is influenced 99.4% by independent variables. For overcoming multicollinearity and autocorrelation problems multiple regression model has been developed several times on monthly data and the findings of each of the model are presented in the following table 6-5:

Table – 6.5: Summary results of step-wise multiple regression analysis:

Steps	Independent variables	Findings	Decision
1	Number of listed companies, number of initial public offerings, issued capital, turnover, number of shares issued (supply of shares), number of shares traded, number of companies paid dividend, percentage of dividend paid, dividend yield, dividend payout ratio, earnings per share, dividend per share, book value per share (net asset value per share), price-earning multiple, market to book value ratio	1. Multicollinearity problem. 2.No autocorrelation 3. Results are not statistically significant. 4.Independent variables have no significant impact on dependent variable	To exclude some of the independent variables.
2	Number of listed companies, number of initial public offerings, dividend yield, dividend payout ratio, earnings per share, dividend per share, book value per share (net asset value per share), price-earning multiple, market to book value ratio	1. Multicollinearity problem between DPR and other variables. 2.No autocorrelation 3. Results are not statistically significant. 4.Independent variables have no significant impact on dependent variable	To exclude dividend payout ratio because it is highly related with other independent variables.
3	Number of listed companies, number of initial public offerings, dividend yield, earnings per share, dividend per share, book value per share (net asset value per share), price-earning multiple, market to book value ratio	1. Multicollinearity problem between MBRTO and PERTO with other variables. 2.No autocorrelation 3. Results are not statistically significant. 4.Independent variables have no significant impact on dependent variable	To exclude MBRTO because it is highly related with other independent variables.
4	Number of listed companies, number of initial public offerings, dividend yield, earnings per share, dividend per share, book value per share	1. Multicollinearity problem between MBRTO and PERTO with other variables. 2. Autocorrelation problem.	To exclude independent variables that have no significant effect on

	(net asset value per share), price-earning multiple.	3. Results are statistically significant. 4. Some of the independent variables have significant impact on dependent variable	dependent variable and covert monthly data into percentage change for overcoming autocorrelation problem.
5	Percentage change of number of listed companies, number of initial public offerings, dividend yield, earnings per share, dividend per share, book value per share (net asset value per share), price-earning multiple.	1. No Multicollinearity problem. 2. Autocorrelation is inclusive. 3. Results are not statistically significant. 4.Independent variables have no significant impact on dependent variable	To use original data for making the impact of independent variables on dependent variable.
6	Book value per share, number of listed companies, number of listed securities, number of initial public offerings, earnings per share and dividend per share.	1. Multicollinearity problem. 2. No autocorrelation problem. 3. Results are not statistically significant. 4.BVPS and EPS have no significant impact on dependent variable	To exclude BVPS for overcoming multicollinearity problem. To use monthly data for making results statistically significant.
7	Number of listed companies, number of listed securities, number of initial public offerings, earnings per share and dividend per share.	1. No multicollinearity. 2. No autocorrelation problem. 3. Results are statistically significant. 4.All independent variables have significant impact on dependent variable	To convert variables into percentage from for overcoming autocorrelation problem.
8	Percentage change of all independent variables	1. Multicollinearity problem. 2. No autocorrelation. 3. Results are not statistically significant. 4.All independent variables have no significant impact on dependent variable	To choose previous step 7 for modeling finally.

**** Results of all regression analyses are presented in appendix - A.**

Finally the following multiple regression model has been formulated based on step 7:

PRICE = 238 + 0.198LSTC + 0.241LSTS + 6.83IPOS + 1.35EPS - 15.4DPS

LSTC = number of listed companies,

LSTS = number of listed securities (mil.),

IPOS = number of initial public offerings,

EPS = earnings per share,

DPS = dividend per share,

Predictor	Coef	SE Coef	t	Significance
Constant	237.9	118.4	2.01	0.046
LSTC	0.1975	0.6418	0.31	0.759
LSTS	0.2411	0.0640	3.77	0.000
IPOS	6.8340	1.702	4.01	0.000
EPS	1.350	2.831	0.48	0.634
DPS	-15.390	3.312	-4.65	0.000

S = 114.6 R-Sq = 52.5% R-Sq (adj) = 21.6%

Analysis of Variance

Source	DF	SS	MS	F	Significance F
Regression	5	663860	132772	10.52	0.000
Residual Error	150	1968674	13124		
Total	155	2632534			

Durbin-Watson statistic = 1.82 Lower limit = 1.46 Upper limit = 1.63

The overall result is statistically significant. The impact of volume of listed securities, number of initial public offerings and dividend per share is statistically significant whereas number of listed companies and earning per share have no significant effect on price. The value of Durbin-Watson Statistics is 1.82 is above the upper limit of table value that indicates that there is no autocorrelation. The value of coefficient of determination, r^2 = 52.5%, interpretes that out of 100% change in dependent variable is influenced 52.5% by independent variables. The correlation matrix presented below shows that there is no multicollinearity problem among independent variables. When the correlation coefficient between dependent variable and one independent variable is higher than that of between two independent variables then it indicates that there is no multicollinarity problem among independent variables.

Correlation matrix

		PRICE	LSTC	LSTS	IPOS	EPS	DPS
Pearson Correlation	PRICE	1.0000	0.0795	0.1182	0.3110	0.1832	-0.0418
	LSTC		1.0000	0.0735	-0.2566	0.0457	0.0676
	LSTS			1.0000	-0.2797	0.1311	0.0821
	IPOS				1.0000	-0.0004	-0.2250
	EPS					1.0000	0.0896
	DPS						1.0000

Empirical results on impact of dividend on stock price:

Group A: Positive relationship between dividend and stock price:

Meckiling (1976) & Gordon (1962) showed the positive relationship between dividend and stock price. Ross (1977) examined that management decision to increase dividend provides a credible signal to investors that the firm's management forecasts good future earnings. Fehr & Peterson (1988) found a significant positive relationship between announcement date returns and yield for dividend increase even after controlling for the magnitude of the dividend change. Litzenberger & Ramaswamy (1979) found that there is positive relationship between dividend yield and expected returns.

Group B: Negative relationship between dividend and stock price:

Rakesh Bali & Gailen L. Hite (1998) examined that the closing price on the last cum dividend day is the sum of two components, the current dividend and the present value of all future dividends then the price drop on the ex dividend day is the value of the current dividend. Empirical results by Watts (1973), gonedes (1978) and Penman (1983) indicated that dividends are not good predictors of firm's future earnings and prices. Dhillon & Johnson (1994) found that stock prices reaction to announcements of dividends is opposite direction.

The empirical result of this study is inconsistent with the results of group A and consistent with group B. The model of this study shows the negative relationship between dividend payment and stock price. The main reason behind this result is that, most of the previous studies considered the cum-dividend and ex-dividend effect on stock price, but this study considered the effect of annual average dividend on annual average price. Another important reason is that DSE market is inefficient i.e., there is no announcement and

information effect on stock price. Most of the investors are eager to capital gain from short-term investment period rather than long-term dividend benefit. Also they are lack of appropriate information about the companies' performance, financial position and future plans.

Masulis & Korwar, Asquith & Mullins and Williams & Krasker (1986) proved that the stock price following the announcement of a stock issue is inversely related to the issue size. The result of this study is consistent with the above empirical result.

ii. Impact of stock market characteristics on return

Based on annual data of all independent variables initially the multiple regression model on return is:

RETURN (%) = - 373 + 1.79 LSTC - 0.054 LSTS-0.000327 MCAP + 4.8 IPOS + 1.08 BVPS - 18.5 EPS + 14.0 DPS + 1.01 PERTO- 36.1 DYLD + 14.9 MBRTO - 52.7 DPR

Here:

LSTC= number of listed companies,
LSTS = number of listed securities (mil.),
MCAP= market capitalization (mil. Tk.),
IPOS= number of initial public offerings,
BVPS = book value per share,
EPS = earnings per share,
DPS = dividend per share,
PERTO = price-earnings ratio
DYLD = dividend yield,
MBRTO = market to book or net asset value ratio
DPR = dividend payout ratio.

Predictor	Coef	SE Coef	T	P
Constant	-372.9	901.3	-0.41	0.750
list. Se	1.795	2.738	0.66	0.631
Listed s	-0.0536	0.3906	-0.14	0.913
Market c	-0.0003274	0.0008286	-0.40	0.760
IPOs	4.77	11.37	0.42	0.747
Book val	1.084	1.290	0.84	0.555
EPS	-18.51	13.67	-1.35	0.405
DPS	13.97	33.33	0.42	0.747
P/E rati	1.010	2.274	0.44	0.734
DY(%)	-36.09	34.02	-1.06	0.481
MV/BV ra	14.89	81.41	0.18	0.885
DPR(%)	-52.67	81.79	-0.64	0.636

S = 69.43 R-Sq = 86.2% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	11	30210	2746	0.57	0.788
Residual Error	1	4820	4820		
Total	12	35030			

Durbin-Watson statistic = 2.59; Lower limit of Durbin-Watson statistic = 0.56; Upper limit of Durbin-Watson statistic = 2.21

The above regression model can help us to predict future return based on all included independent variables. But from this model future forecasted results will not be accurate and reliable. Because there are multicollinearity and autocorrelation problems, results are not statistically significant and independent variables are not significant for predicting dependent variables. The value of coefficient of determination, r^2 = 86.2%, represents that out of 100% change in dependent variable is influenced 86.2% by independent variables. By conducting multiple regression analysis in several steps for overcoming multicollinearity problem, autocorrelation problem, making the results statistically significant and the significance of independent variables on dependent variable return finally the multiple regression model based on 156 monthly data is:

RETURN = - 2.28 + 0.0106 BVPS + 0.0569 PERTO

Here, BVPS = book value per share and PERTO = price-earnings ratio

Predictor	Coef	SE Coef	T	P
Constant	-2.276	1.740	-1.31	0.193
BVPS	0.01063	0.01427	0.74	0.457
PERTO	0.05687	0.01777	3.20	0.002

S = 6.651 R-Sq = 56.3% R-Sq(adj) = 5.1%
PRESS = 7297.84 R-Sq (pred) = 0.00%

Analysis of Variance

Source	DF	SS	MS	F	Signifi F
Regression	2	453.88	226.94	5.13	0.007
Residual Error	153	6767.24	44.23		
Total	155	7221.13			

Durbin-Watson statistic = 1.79 Lower limit of Durbin-Watson statistic = 1.63; Upper limit of Durbin-Watson statistic = 1.72

According to DW statistics there is no autocorrelation between current period's return and lag periods return i.e. current periods return is independent from its previous periods return. The results indicate that independent variable price-earnings multiple is significant and book value per share is insignificant for dependent variable. The value of coefficient of determination, r^2 = 56.3%, explains that out of 100% change in dependent variable is influenced 56.3% by independent variables and remaining 43.7% by other factors. Since there are no problems of multicollinearity and autocorrelation and results are statistically significant, the model is acceptable and it will provide accurate future forecasted results.

6.2.2. Macroeconomic variables:

From the view point macroeconomic variables many factors are supposed to influence stock price and return such as GDP, per capita income, savings, investment, export, import, foreign exchange reserve, inflation rate, money supply, consumption, deposit interest rate, advance interest rate and others. Information related to these variables is presented in the following table 6.6:

Table – 6.6: Summary of macroeconomic variables (Bil. Tk.)

Year	GDP	Growth rate	Per capita GDP (Tk.)	Savings	Investment	Consumption	Import	Export	Foreign exchange reserve (Bil. $)	Rate of infla-tion	Money supply	Deposit interest rate	Advance interest rate
1993	1455.7	4.60	10991.2	225.1	225.0	1099.5	159.3	92.6	2.121	2.7	406.03	6.20	13.71
1994	1515.1	4.10	11583.6	254.5	249.2	1176.7	167.7	101.0	2.765	3.3	475.67	5.17	12.49
1995	1589.8	4.90	12838.2	291.7	291.6	1325	234.6	139.3	3.070	8.9	554.49	5.26	12.50
1996	1663.2	4.60	13768.5	332.5	332.5	1418.4	283.0	158.8	2.039	6.7	602.19	6.49	13.56
1997	1752.8	5.40	14739.1	374.5	374.5	1519.6	305.4	188.1	1.719	3.96	658.77	6.98	14.01
1998	1844.5	5.20	16078.4	435.9	433.0	1653.2	341.9	234.2	1.739	8.66	717.58	7.11	14.12
1999	1934.3	4.90	17394.9	490.1	487.6	1808	384.8	254.9	1.523	7.06	802.8	7.26	13.98
2000	2049.3	5.90	18511.0	547.6	545.9	1946.9	421.3	288.2	1.602	2.79	946.41	7.08	13.75
2001	2157.4	5.30	19525.0	568.1	585.4	2079.2	503.7	348.6	1.307	1.94	1095.17	6.75	13.42
2002	2252.6	4.40	20754.0	640.4	632.4	2235.9	490.5	343.7	1.583	2.79	1227.81	6.49	13.09
2003	2371.0	5.30	22530.0	734.9	703.5	2458.3	559.2	379.2	2.470	4.38	1407.43	6.25	12.36
2004	2519.7	6.30	24628.0	847.2	799.9	2718	642.6	448.3	2.705	5.83	1601.16	5.56	10.83
2005	2655.1	5.40	26898.0	976.1	900.3	2941.9	807.1	532.3	3.024	6.49	1871.36	5.90	11.14

Source: Bangladesh Bank, BBS, Finance division, NBR, ERD, National savings board and Bangladesh Economic Review

Macroeconomic variables analysis:

a) Simple regression and correlation analysis:

This analysis is conducted by considering the price of selected stocks as dependent variable and gross domestic product, per capita income, savings, investment, import, export, foreign exchange reserve, broad money, narrow money, inflation rate, deposit interest rate, advance interest rate and consumption as separate independent variable. The analytical results are presented in the table 6.7:

Table – 6.7: Results of simple regression equation on average share price of some important macroeconomic variables:

Independent variables	Inter cept	Regression coefficient	r^2	Correlation coefficient	Probability value of t	Signifi-cant at t=0.05	Adjusted R square	Standard error	F-value	Significant at F=0.05
GDP	187.46	0.0627	0.0914	0.1394	0.5032	Not	-0.069	181.494	0.6497	Not
Growth rate	44.28	52.4358	0.0329	0.1814	0.9217	Not	-0.0550	180.2445	0.5532	Not
Per capita income	215.93	0.0054	0.0239	0.1547	0.2827	Not	-0.064	181.078	0.6139	Not
Savings	246.54	0.1261	0.0281	0.1676	0.0762	Not	-0.060	180.692	0.5842	Not
Investment	250.07	0.1221	0.0221	0.1488	0.0875	Not	-0.066	181.242	0.6275	Not
Import	233.49	0.1918	0.0432	0.2079	0.0811	Not	-0.044	179.280	0.4956	Not
Export	259.98	0.1916	0.0221	0.1486	0.0456	Yes	-0.067	179.2495	0.6281	Not
Foreign exchange reserve	111.92	93.87	0.1070	0.3271	0.5479	Not	0.0258	173.202	0.2753	Not
Rate of inflation	202.11	21.7510	0.0863	0.2938	0.1147	Not	0.0032	175.1963	0.3299	Not
Broad money	247.17	0.0855	0.0346	0.1859	0.0535	Not	-0.053	180.087	0.5431	Not
Narrow money	211.33	0.5111	0.0523	0.2287	0.1539	Not	-0.0338	178.424	0.4522	Not
Advance interest rate	1063.82	-57.869	0.1259	0.3548	0.1036	Not	0.0464	171.362	0.2343	Not
Deposit interest rate	651.61	-59.8631	0.0579	0.2407	0.1646	Not	-0.0277	177.895	0.4283	Not
Consumption	218.97	0.0494	0.0274	0.1656	0.2339	Not	-0.061	180.752	0.5886	Not

b) Multiple regression and correlation analysis:

i. Impact of macro variables on price:

By performing multiple regression and correlation analysis based on all selected independent variables on dependent variable price the following regression model is obtained:

PRICE = 3871 + 109 GDPGR - 2.3 SAVGS + 4.9 IMPRT - 12.8 EXPRT - 449 FEXRV + 35.9 RINFL + 0.69 BRDM (M_2) + 14.9 NRWM (M_1) + 180 DPINT - 337 ADINT - 0.47 CONSM.

Here, GDPGR= gross domestic product's growth rate, SAVGS= savings (Bil. Tk.), IMPRT= import (Bil.Tk.), EXPRT= export (Bil. Tk.), FEXRV= foreign exchange reserve (Bil.Tk.), RINFL= rate of inflation, BRDM= broad money (Bil. Tk.), NRWM = narrow money (Bil. Tk.), DPINT= deposit interest rate, ADINT= advance interest rate and CONSM= consumption (Bil. Tk.).

Predictor	Coef	SE Coef	T	P
Constant	3871	5251	0.74	0.596
Growth r	108.7	346.7	0.31	0.807
Savings	-2.33	13.30	-0.17	0.890
Import	4.87	15.50	0.31	0.806
Export	-12.78	24.57	-0.52	0.695
Foreign	-449	1096	-0.41	0.752
Rate of	35.93	69.93	0.51	0.698
Broad mo	0.686	4.022	0.17	0.893
Narrow m	14.91	23.41	0.64	0.639
Deposit	180	2104	0.09	0.946
Adv. Int	-337	1167	-0.29	0.821
Consmp.	-0.468	2.936	-0.16	0.899

S = 183.6 R-Sq = 90.9% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	11	335810	30528	0.91	0.684
Residual Err.	1	33712	33712		
Total	12	369522			

Durbin-Watson statistic = 3.55 Lower limit =0.56 Upper limit =2.21

The above regression model can help us to predict future price based on all included independent variables. There is no autocorrelation problem. But from this model future forecasted results will not be accurate and reliable. Because there is multicollinearity problem, results are not statistically significant and independent variables are not significant for predicting dependent variables. By conducting multiple regression analysis in several steps for overcoming multicollinearity problem, autocorrelation problem, making the results statistically significant and the significance of independent variables on dependent variable price finally the multiple regression model is:

PRICE = 492 + 18.5 RINFL - 54.7 DPINT + 0.0411 CNSMP

Here, RINFL = rate of inflation, DPINT= deposit interest rate, CNSMP = consumption

The regression equation is
PRICE = 492 + 18.5 RINFL - 54.7 DPINT + 0.0411 CNSMP

Predictor	Coef	SE Coef	T	P
Constant	492.3	533.0	0.92	0.380
RINFL	18.48	22.43	0.82	0.431
DPINT	-54.68	75.34	-0.73	0.486
CNSMP	0.04111	0.08996	0.46	0.659

S = 183.2 R-Sq = 54.6% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	3	51777	17259	0.51	0.047
Residual Error	9	301930	33548		
Total	12	353707			

Durbin-Watson statistic = 1.73 Lower limit 0.95 Upper limit 1.54

The overall result is statistically significant. The value of Durbin-Watson Statistics is 1.73 is above the upper limit of table value that indicates that there is no autocorrelation. The value of coefficient of determination, r^2 = 54.6%, indicates that out of 100% change in dependent variable is influenced 54.6% by independent variables. The correlation matrix presented below shows that there is no multicollinearity problem among independent

variables. When the correlation coefficient between dependent variable and one independent variable is higher than that of between two independent variables then it indicates that there is no multicollinarity problem among independent variables.

Correlation matrix for testing multicollinearity:

		PRICE	RINFL	DPINT	COSMP
Pearson Correlation	**PRICE**	1.000	0.277	-0.251	0.138
	RINFL		1.000	-0.103	-0.011
	DPINT			1.000	0.001
	COSMP				1.000

Based on monthly data the multiple regression equation of price on macroeconomic variables is:

PRICE = 2378 + 74.5 GRATE + 6.49 IMPRT - 12.3 EXPRT - 341 FEXRV + 25.7 RINFL + 0.774 MSPLY - 147 ADINT

Here, GRATE= growth rate, IMPRT= import, EXPRT = export, FEXRV= foreign exchange reserve, RINFL=rate of inflation, MSPLY= money supply, ADINT= advance interest rate.

Predictor	Coef	SE Coef	T	Significance
Constant	2377.8	463.6	5.13	0.000
GRATE	74.49	16.14	4.62	0.000
IMPRT	6.4902	0.5361	12.11	0.000
EXPRT	-12.3079	0.9891	-12.44	0.000
FEXRV	-341.29	45.51	-7.50	0.000
RINFL	25.719	4.593	5.60	0.000
MSPLY	0.7739	0.2121	3.65	0.000
ADINT	-147.27	27.54	-5.35	0.000

S = 85.16 R-Sq = 59.2% R-Sq(adj) = 57.3%
PRESS = 1190776 R-Sq(pred) = 54.77%

Analysis of Variance

Source	DF	SS	MS	F	Significance F
Regression	7	1559117	222731	30.71	0.000
Residual Error	148	1073418	7253		
Total	155	2632534			

Durbin-Watson statistic = 0.37 Lower limit =1.57 Upper limit =1.78

The above multiple regression model indicates that there is autocorrelation problem, but there is no multicollinearity problem, results are statistically significant and all the independent variables are significant for dependent variable. By converting independent variable into percentage change on previous period, autocorrelation problem can be overcome, but multicollinearity problem is arisen. So by accepting autocorrelation problem the above model is considered as future forecasted model for price.

ii. Impact of macro variables on return

By performing multiple regression and correlation analysis based on all selected independent variables on dependent variable return the following regression model is obtained:

RETURN (%) = - 78 + 40 GDPGR + 1.35 SAVGS + 4.40 IMPRT - 6.7 EXPRT - 142 FEXRV - 7.0 RINFL - 1.32 BRDM (M2) - 3.7 NRWM (M1) - 354 DPINT + 118 ADINT + 1.06 CONSM.

Here: GDPGR= gross domestic product's growth rate, SAVGS= savings (Bil. Tk.), IMPRT= import (Bil.Tk.), EXPRT= export (Bil. Tk.), FEXRV= foreign exchange reserve (Bil.Tk.), RINFL= rate of inflation, BRDM= broad money (Bil. Tk.), NRWM = narrow money (Bil. Tk.), DPINT= deposit interest rate, ADINT= advance interest rate and CONSM= consumption (Bil. Tk.).

Predictor	Coef	SE Coef	T	P
Constant	-78	3214	-0.02	0.985
Growth r	40.3	212.2	0.19	0.880
Savings	1.355	8.139	0.17	0.895
Import	4.399	9.487	0.46	0.724
Export	-6.68	15.04	-0.44	0.734
Foreign	-142.3	670.6	-0.21	0.867
Rate of	-6.99	42.80	-0.16	0.897
Broad mo	-1.319	2.461	-0.54	0.687
Narrow m	-3.67	14.33	-0.26	0.840
Deposit	-354	1288	-0.28	0.829
Adv. Int	117.5	714.5	0.16	0.896
Consmp.	1.057	1.797	0.59	0.661

S = 112.4 R-Sq = 64.0% R-Sq(adj) = 0.0%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	11	22402	2037	0.16	0.970
Residual Error	1	12628	12628		
Total	12	35030			

Durbin-Watson statistic = 3.55 Lower limit =1.57 Upper limit =1.78

The above regression model can help us to predict future return based on all included independent variables. There is no autocorrelation problem, but there are multicollinearity problem. Results are not statistically significant and independent variables are not significant for predicting dependent variables. So from this model future forecasted results will not be accurate and reliable. By conducting multiple regression analysis in several steps for overcoming multicollinearity problem, autocorrelation problem, making the results statistically significant and the significance of independent variables on dependent variable return finally the multiple regression model is:

RTRN = 239 + 8.8 GR - 1.25 RINFL - 40.1 DPINT

Here,

GR = growth rate,
RINFL = rate of inflation,
DPINT = deposit interest rate.

The regression equation is
RTRN = 239 + 8.8 GR - 1.25 RINFL - 40.1 DPINT

Predictor	Coef	SE Coef	T	P
Constant	238.9	179.7	1.33	0.216
GR	8.77	26.09	0.34	0.744
RINFL	-1.249	6.600	-0.19	0.854
DPINT	-40.09	22.49	-1.78	0.108

S = 53.63 R-Sq = 26.1% R-Sq (adj) = 1.5%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	3	9141	3047	1.06	0.413
Residual Error	9	25889	2877		
Total	12	35030			

Durbin-Watson statistic = 2.34

Correlation matrix

		RTRN	GR	RINFL	DPINT
Pearson Correlation	RTRN	1.000	-0.002	0.007	-0.500
	GR		1.000	0.078	0.185
	RINFL			1.000	-0.103
	DPINT				1.000

In consideration of **monthly data** the multiple regression equation of return on macroeconomic variables is:

RETURN = 16.4 - 0.00011 MSPLY - 2.52 DPINT

Here,

MSPLY = money supply,

DPINT = deposit interest rate

Predictor	Coef	SE Coef	T	P
Constant	16.355	5.262	3.11	0.002
MSPLY	-0.000107	0.001209	-0.09	0.930
DPINT	-2.5164	0.7878	-3.19	0.002

S = 6.651 R-Sq = 76.3% R-Sq(adj) = 65.1%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	2	453.41	226.71	5.13	0.007
Residual Error	153	6767.71	44.23		
Total	155	7221.13			

Durbin-Watson statistic = 1.76 Lower limit = 1.63 Upper limit =1.72

The above multiple regression model indicates that there is no autocorrelation and multicollinearity problem, results are statistically significant, independent variable deposit interest rate is significant for dependent variable return but money supply is not significant for return. The overall result is statistically significant. The deposit interest rate has significant impact on return. The value of Durbin-Watson Statistics is 1.76 is above the upper limit of table value that shows that there is no autocorrelation. The value of coefficient of determination, r^2 = 76.3%, explains that out of 100% change in dependent variable is influenced 76.3% by independent variables.

Empirical results on impact of inflation on stock price:

Negative relationship between inflation and stock price:

Tony Caporate & Chulho (1997) provided a time series measure of expectation is used to demonstrate the existence of an inverse relationship between inflation and real stock prices, even after controlling for output shocks. Fama (1981) argued that the negative inflation stock return relationship is generated by a positive causal link between real output and stock returns coupled with an inverse correlation between real output and inflation. A negative relationship between stock returns and inflationary trends has been widely documented for developing economies (Arjun Chatrath, Sanjay Ramachader & Frang Song, 1997).

6.3. Test the validity of the model:

6.3.1. Test of multicollinearity:

Since the study concerns with impact of both microeconomic and macroeconomic variables on price and return, there are four different models have been developed. Though four different models have been formulated, finally the model represents the impact of stock market characteristics on share price has been checked. Multicollinearity among independent variables can be tested in two different ways such as by applying Ramsay Reset test and by forming correlation matrix. In this study by preparing a correlation matrix the multicollinearity problem is tested. Since the correlation coefficient between dependent variable and specific independent variable is higher than that of between two independent variables, there is no multicollinearity problem in this model.

Correlation matrix for testing multicollinearity:

		PRICE	LSTC	LSTS	IPOS	EPS	DPS
Pearson Correlation	PRICE	1.0000	0.0795	0.1182	0.3110	0.1832	-0.0418
	LSTC		1.0000	0.0735	-0.2566	0.0457	0.0676
	LSTS			1.0000	-0.2797	0.1311	0.0821
	IPOS				1.0000	-0.0004	-0.2250
	EPS					1.0000	0.0896
	DPS						1.0000

6.3.2. Test of autocorrelation:

When independent variables in a multiple regression equation are highly inter-correlated then this is known as autocorrelation. For this autocorrelation, the forecasted results of dependent variable about future based on all selected independent variables may not be reliable and accurate. So for making a multiple regression model that will be used for future forecasting is required to be free from the influence of its previous value, i.e., autocorrelation. This autocorrelation may be tested by applying different models. In this study, autocorrelation has been tested by applying Durbin-Watson Statistics.

According to this model hypotheses are:

H_o: $\rho = o$: There is no autocorrelation among successive observations of independent variable.

H_I: $\rho \neq o$: There is autocorrelation among successive observations of independent variable.

Durbin-Watson Statistics; $DW = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})}{\sum_{t=1}^{n} e_t^2}$

Where, e_t = error or difference between point and line

e_{t-1} = error or difference between point and line for previous time period

$\sum_{t=2}^{n}(e_t - e_{t-1})^2$ = Difference between present residual and previous residual, squared and summed for all observations

$\sum_{t=2}^{n} e_t^2$ = Each of residuals squared and then summed

In this study the critical bounds for lower limit (L) and upper limit (U) at 5% significance level for 5 independent variables are 1.46 and 1.63 for price where calculated value is 1.82. Model applied for return with 2 independent variables has L 1.63 and U 1.72, where the calculated value is 1.79.

Calculated values of DW both for price and return are higher than upper bound/limit.

If DW> U, conclude H_o
If DW< L, conclude H_I
If DW lies within the lower and upper bounds (L<DW<U), conclude that the test is inconclusive.

So, there is no autocorrelation.

Test of autocorrelation based on annual price: (a) Index:

Lag	AC	PAC	Q-Stat	Prob.
1	0.198	0.198	0.6368	0.425
2	-0.091	-0.136	0.7842	0.676
3	-0.320	-0.289	2.7820	0.426
4	-0.114	-0.005	3.0655	0.547
5	-0.114	-0.163	3.3829	0.641
6	-0.138	-0.229	3.9157	0.688
7	-0.077	-0.098	4.1077	0.767
8	0.289	0.243	7.3590	0.498
9	0.190	-0.042	9.1237	0.426
10	-0.058	-0.182	9.3460	0.500
11	-0.166	0.011	12.033	0.361

(b) Price:

Lag	AC	PAC	Q-Stat	Prob.
1	0.261	0.261	1.1058	0.293
2	-0.189	-0.276	1.7416	0.419
3	-0.383	-0.288	4.6026	0.203
4	-0.196	-0.074	5.4375	0.245
5	-0.160	-0.281	6.0649	0.300
6	-0.128	-0.276	6.5233	0.367
7	-0.048	-0.236	6.5982	0.472
8	0.271	0.053	9.4708	0.304
9	0.178	-0.219	11.023	0.274
10	0.011	-0.195	11.031	0.355
11	-0.080	-0.101	11.648	0.391

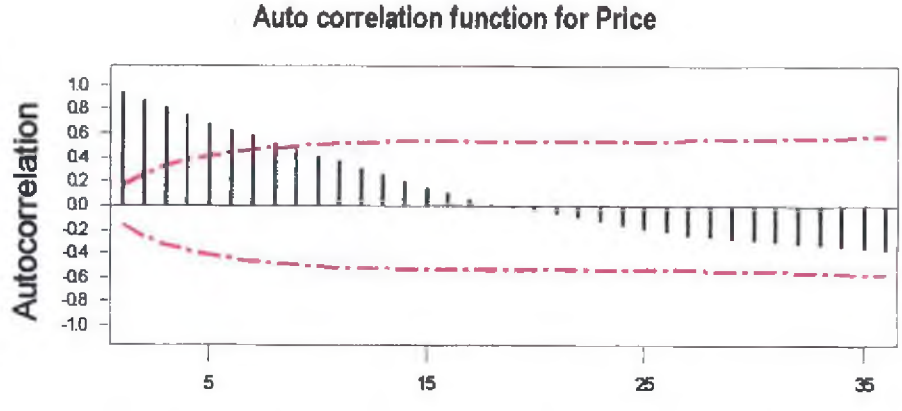
(c) Return:

Lag	AC	PAC	Q-Stat	Prob.
1	0.081	0.081	0.0992	0.753
2	-0.291	-0.300	1.5243	0.467
3	-0.213	-0.175	2.3738	0.499
4	0.123	0.075	2.6902	0.611
5	-0.057	-0.206	2.7693	0.736
6	-0.245	-0.253	4.4504	0.616
7	-0.026	-0.037	4.4724	0.724
8	0.141	-0.072	5.3091	0.724
9	-0.012	-0.172	5.3176	0.806
10	0.052	0.106	5.5437	0.852

The above three figures represent the autocorrelation and partial autocorrelation of all share price index, annual average price and annual average return. If the probability value of Q-statistics is less than 0.05, then it indicates the existence of autocorrelation and partial autocorrelation. The probability values represent in the above three figures are more than 0.05 for all periods, which indicate that there is no autocorrelation and partial autocorrelation in all share price index, price and return.

Test of autocorrelation and partial autocorrelation through graphical presentation

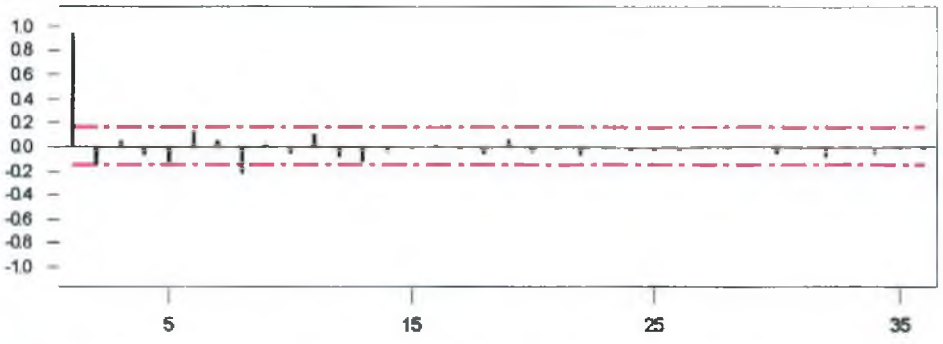
If the correlation coefficient between current value and lag value is outside the confidence interval (red line) then it is considered that there is autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. The following figure represents that up-to 8 lags there is autocorrelations and thereafter no autocorrelation.



Lag	Corr	T	LBQ	Lag	Corr	T	LBQ	Lag	Corr	T	LBQ	Lag	Corr	T	LBQ
1	0.95	11.83	142.70	10	0.41	1.59	780.27	19	-0.01	-0.04	845.36	28	-0.26	-0.95	886.43
2	0.88	6.58	267.03	11	0.36	1.40	802.91	20	-0.04	-0.15	845.64	29	-0.28	-1.01	911.63
3	0.82	4.92	375.94	12	0.31	1.19	819.82	21	-0.07	-0.26	846.54	30	-0.29	-1.06	928.52
4	0.76	3.98	469.80	13	0.26	0.97	831.29	22	-0.10	-0.38	846.43	31	-0.31	-1.09	946.87
5	0.69	3.28	547.15	14	0.21	0.77	838.60	23	-0.13	-0.47	851.48	32	-0.32	-1.13	967.23
6	0.63	2.82	612.58	15	0.15	0.57	842.75	24	-0.16	-0.59	858.19	33	-0.33	-1.18	989.68
7	0.59	2.50	669.80	16	0.10	0.39	844.69	25	-0.19	-0.70	862.98	34	-0.35	-1.21	1014.20
8	0.53	2.16	716.05	17	0.06	0.21	845.28	26	-0.22	-0.80	872.07	35	-0.36	-1.24	1040.63
9	0.46	1.85	752.24	18	0.02	0.07	845.34	27	-0.24	-0.88	883.22	36	-0.37	-1.27	1068.86

If the correlation coefficient between current value and lag value is outside the confidence interval from -0.18 to +0.18 (red line) then it is considered that there is partial autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. The above figure represents that only first lag there is partial autocorrelation and thereafter no partial autocorrelation. The following figure represents these results:

Partial autocorrelation function for Price



Lag	PAC	T	Lag	PAC	T	Lag	PAC	T	Lag	PAC	T
1	0.95	11.83	10	-0.05	-0.62	19	0.07	0.85	28	-0.02	-0.20
2	-0.16	-1.95	11	0.11	1.38	20	-0.04	-0.46	29	0.01	0.17
3	0.05	0.61	12	-0.09	-1.06	21	-0.03	-0.33	30	-0.05	-0.60
4	-0.08	-0.94	13	-0.12	-1.48	22	-0.06	-0.80	31	-0.02	-0.21
5	-0.13	-1.64	14	-0.04	-0.47	23	-0.02	-0.25	32	-0.08	-0.99
6	0.13	1.67	15	-0.02	-0.20	24	-0.05	-0.59	33	0.01	0.09
7	0.05	0.67	16	0.03	0.31	25	-0.02	-0.28	34	-0.05	-0.64
8	-0.23	-2.81	17	-0.01	-0.10	26	-0.05	-0.58	35	-0.02	-0.19
9	0.02	0.30	18	-0.06	-0.70	27	0.01	0.16	36	-0.02	-0.24

6.3.3. Test of heteroscedasticity:

Heteroscedasticity exists when the errors do not have a constant variance across an entire range of values. In this study heteroscedasticity is tested by applying White Test. Under this testing method following steps are followed:

Formulation of hypotheses:

Ho: There is no hetroscedasticity among error terms. $\xi_1 = 0$

H_1: There is hetroscedasticity among error terms.

Step 1: Run a regression model

$$P_t = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \varepsilon_t$$

Step 2: Calculation of residuals

Step 3: Run an auxiliary regression model

$$\varepsilon_t = \lambda + \xi_1 x_1 + \xi_2 x_2 + \xi_3 x_3 + ... + \xi_4 x_1^2 + \xi_5 x_2^2 + \xi_6 x_3^2 + ... +$$
$$\xi_7 x_1 x_2 + \xi_8 x_2 x_3 + \xi_9 x_1 x_3 + ... + \xi_{10} x_1 x_2 x_3 + ... +$$
$$\xi_{36} x_1 x_2 x_3 x_4 x_5 + \gamma_t$$

Step 4: Obtain the value of R^2 from the auxiliary regression model.

Step 5: Obtain the critical value of Chi Square from the table at particular significant level.

$$TR^2 = \chi^2 \sim (m)$$

White Test has been conducted on the 156 observations of DSE price. The test has been performed on the original data to test the level of heteroscedasticity. In the test at 5% significance level under 36 regressors the critical value of Chi square is 21.03 that is lower than the calculated value 123.29. The H_o, null hypothesis is rejected. So, it can be concluded that there is significant heteroscedasticity among the residuals.

6.3.4. Variance ratio test

This test has been conducted for determining whether the selected set of variables is making an important contribution to explaining the dependent variable's variance or not. This test involves the unbiased estimate of the variance explained by different models divided by the unbiased estimate of the unexplained or error variance.

Hypotheses of this test are:

H_o: The set of independent variables has not important contribution to explain the dependent variable.

H_1: The set of independent variables has important contribution to explain the dependent variable.

$$F = \frac{\left(r_F^2 - r_R^2\right)/(K_F - K_R)}{\left(1 - r_F^2\right)/(N - K_F)}$$

Where,

r_F^2 =For full model

r_R^2 =For restricted model being tested

K_F =Number of linearly independent parameters to be estimated in full model

K_R =Number of linearly independent parameters to be estimated in restricted model

N =Sample size

$r_F^2 - r_R^2$ =Percent of total variance explained by variables or variables dropped out of full model

$1 - r_F^2$ =Percent of total variance not explained by full model

The calculated value of variance ratio test (F) from the application of above model is 10.52 whereas the critical value at 5% level of significance for 5 & 151 degrees of freedom is 3.86. So the H_0 is rejected. That is the set of independent variables has important contribution to explain the dependent variable.

6.3.5. Test of normality:

In this study two normality tests are considered:

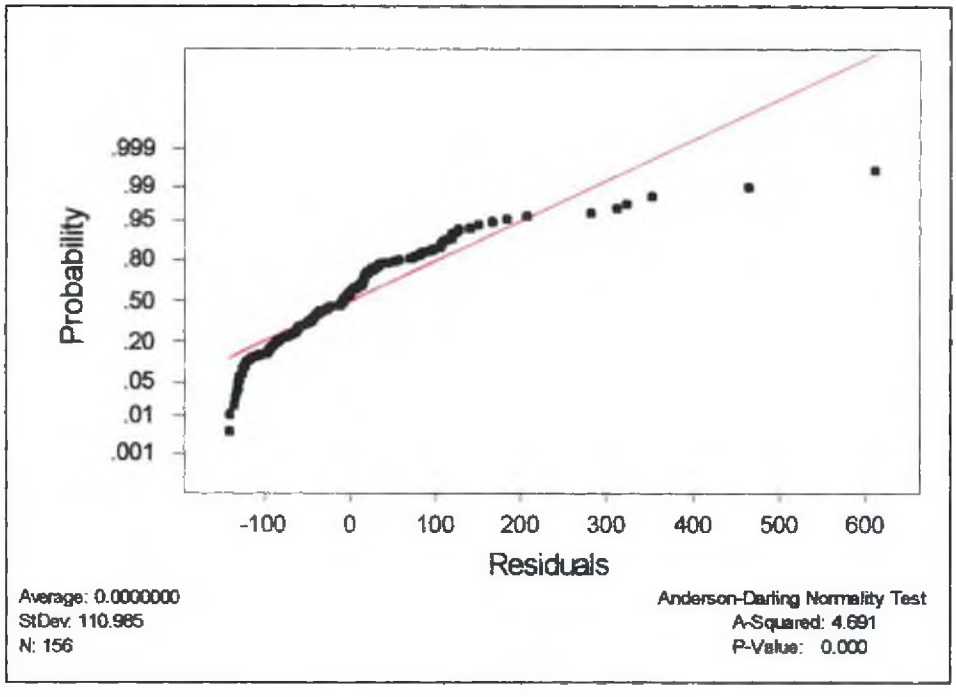
1. Normal probability plot (Anderson Darling Normality Test)
2. Histogram of the Residuals

Normal probability Plot (Anderson Darling Normality Test)

A graphical device to study the shape of the probability density function (PDF) of a random variable is normal probability plot (NPP). On the horizontal axis the values of the variable of price (OLS residuals) and on the vertical axis the expected value of this variable are plotted to test the normality of the distribution. Therefore if the variable is in the form of normal population then the NPP will be approximately a straight line. The NPP of the residuals from the given Price-LSTS, LSTC, IPOS, EPS, DPS regression is

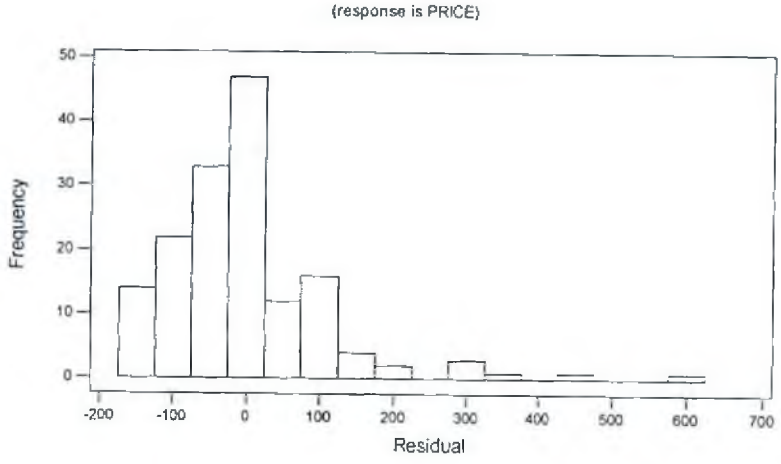
shown in the following figure. If the fitted line in the NPP is approximately a straight line we can conclude that the variable of price is normally distributed. In the following figure it can be viewed that residual from given model is not normally distributed, because a straight line is deviated from the data significantly.

The **Anderson - Darling Normality Test**, known as the A^2 ***statistic.*** The underlying null hypothesis is that the variable under consideration is normally distributed. The following figure shows that the computed A^2 *statistic* **is** 4.691. The *p value* of obtaining such a value of A^2 is 0.000 which is significantly low. Therefore we reject null hypothesis i.e., the residuals from Price-LSTS, LSTC, IPOS, EPS, DPS regression are normally distributed. Parameters of the above distribution are mean value is approximately 0 and standard deviation is about 110.95.



Histogram of the residuals

A histogram of residuals is simple graphical device that is used to learn something about the shape of the probability density function of random variable. On the horizontal axis the values of the residuals (response: price) into suitable intervals and in each class interval we erect rectangles equal to height to the number of observations in that class interval. The following figure is the outcome of the normality test that significantly matched with the previously analyzed Anderson- Darling Test outcome. In the figure, the residuals from the regression seem to be positively distributed which is a common phenomenon of the shares' market price.



6.4. Year-wise comparison of variances

Table -6.8: Summary table of volatility analysis of selected companies:

Year	Average price	Standard deviation of price	Coefficient of variation (SD/ Mean)	Average return (%)	Standard deviation of return	Coefficient of variation (SD/ Mean)	Average index	Standard deviation of index	Coefficient of variation (SD/ Mean)
1993	177.184	4.10	0.032	0	17.0	----	391.09	22.56	0.058
1994	229.262	23.13	0.101	79.25	58.0	0.732	683.40	117.30	0.172
1995	348.672	37.70	0.108	52.49	59.0	1.124	797.66	44.17	0.055
1996	766.523	197.54	0.258	120.36	182.0	151.2	1458.8	822.95	0.564
1997	362.119	108.43	0.299	-51.88	226.0	-4.35	1178.1	396.97	0.337
1998	163.353	30.48	0.187	-54.30	142.0	-2.62	630.60	59.43	0.094
1999	150.492	44.50	0.296	-7.49	258.0	-34.4	515.28	18.02	0.035
2000	238.189	13.24	0.056	58.62	81.0	1.382	579.48	67.82	0.117
2001	273.165	5.76	0.021	16.50	55.0	3.333	669.09	54.87	0.082
2002	187.290	16.03	0.086	-30.84	77.0	-2.49	817.85	46.21	0.057
2003	278.359	6.59	0.024	49.21	57.0	1.158	814.07	47.25	0.058
2004	483.917	74.58	0.154	74.29	67.0	0.902	1340.6	334.99	0.249
2005	442.632	31.90	0.072	-7.72	89.0	-11.5	1709.8	121.53	0.071

In the above table it is presented the average value for last 13 years annual price, return and all share price index. Based on annual data for all these three variables, the standard deviation and coefficient of variation have been calculated for getting an idea about the significance of variability. From the value of coefficient of variation it reveals that except years 1993, 2001 and 2003, the variability of average price is significant, the variability of annual return is significant for all sample years and in case of all share price index, the variability for all sample years except 1999 is significant.

6.5. Conclusion

Based on results of different steps of regression analysis it is evident that the stock price is highly affected by number of listed companies, volume of listed securities, number of initial public offerings, earning per share and dividend per share. Based on macroeconomic variables the price is influenced by growth rate of gross domestic product, amount of import, amount of export, amount of foreign exchange reserve, rate of inflation, volume of money supply and interest rate on advances. Though the study has been conducted from the view point of both stock market characteristics and macroeconomic variables, the value of R^2 indicates that stock market characteristics are more significant than macroeconomic variables for influencing stock price. After formulating the model by identifying the most important independent variables, for validating the model test of autocorrelation, test of multicollinearity, test of heteroscedasticity and variance ratio test have been applied. For being considered a model as best linear unbiased estimate it is required to be free from the problem of multicollinearity, autocorrelation and heteroscedasticity and results to be significant. The model applied in this study is free from multicollinearity and autocorrelation problems, has important contribution for explaining the variance of dependent variable but it has problem of heteroscedasticity. By taking this important limitation the model has been applied for this study and left that part for further research.

CHAPTER - SEVEN

EVIDENCE FROM VOLATILITY FORECASTING MODELS FOR DHAKA STOCK EXCHANGE

7.1. Introduction

Stock price and return are always changing and it is natural. If the change is regular then it is normal and acceptable to all interested parties. This is considered as stable market. But sometimes the rate of change both in price and return is very much high that is considered as abnormal. In this situation most of the time it is difficult for investors to make decision based on future forecasted change. So, before making an investment decision it is better to know the level of risk/variance/volatility of the market. Since the US stock market crash of 1987, Bangladesh stock market crash of 1996 and Asian crisis of 1997, stock price volatility has been the focus of both empirical academic research and regulatory concern. This attention reflects three important considerations. First, the well-noted observation that market volatility has been higher in recent than historical periods and the perception that such increased volatility is due to institutional changes such as automated trading and the introduction of trading in derivative futures and options contracts which may have enhanced the likelihood of large swings in mean stock returns (Edwards, 1988; Schwert 1990; Robinson 1994). Second, although the tendency for stock market volatility to exhibit 'clustering' has long been recognized for introduction of autoregressive conditional hetroscedasticity (ARCH) model by Engle (1982) and its subsequent generalization (GARCH) by Bollerslev (1986) that researchers have formally modeled the second and higher moments of financial time series using econometric techniques. Third, increased recognition has been paid to the practical importance of accurate volatility estimates and forecasts in asset and option pricing models and portfolio selection and market timing decisions (Greenmail 1993; Vasilellis and Meade 1996). These considerations have led to examinations of stationarity and persistence of volatility over time and the accuracy of volatility forecasting techniques.

7.2. Application of Volatility Forecasting Models

Models applied by David McMillan, Alan Speight and Owain Apgwilym for forecasting UK stock market in 2000 are applied for forecasting volatility of DSE stock price. Followings are the forecasting models:

7.2.1. Historical mean

Extrapolation of the historical mean in volatility provides perhaps the most obvious means of forecasting future volatility. Moreover if the distribution of volatility has a stationary mean all variation in estimated volatility is attributable to measurement error and the historical mean, $\bar{\sigma}$, computed as the unweighted average of volatility observed in-sample, then gives the optimal forecast of volatility, 'h, for all future periods. Forecasts based on this mean also provide a benchmark for the comparative evaluation of the alternative forecasting models. In addition to this in-sample historical mean, it is also considered that the recursive assessment of the historical mean, iteratively updated with each incremental observation on volatility over the out of sample period.

Such that the mean of historic volatility and forecasting of future volatility at any point in time during the out of sample period is based on all information on actual volatility available at that point in time.

From the analysis it is found that the value of historical mean of the volatility of price is 902.91 (excluding the prices of the year 1996). In this study the prices of 1996 are considered as outliers due to unusual share market condition at that time period. As a forecasting model historical mean of the prior volatility doesn't provide the best forecast. It is simple naïve model that suggests the average volatility of the historical price. Forecasted results under this model are shown in Appendix: Table- B1.

7.2.2. Moving average

Under the moving average method volatility is forecasted by an unweighted average of past observed volatilities over a particular historical time interval of fixed length. Application of the moving average model in the DSE stock price to forecast the extent of volatility may not be significant enough because of the abnormal condition existed in the

security market. According to the given model the average volatility of the stock prices of last 13 years, T=156, at MA length 2 the average dispersion is 578.3 (Appendix: Table - B2). Due to unpredictable price fluctuation in different months of different years like January, February of 1997 and so on this wide range of dispersion has been resulted. So in order to forecast the future volatility of the price this value will not provide significant outcome.

7.2.3. Random walk

The preceding models presume reversion to a stable or gradually shifting trend in volatility. However if volatility fluctuates randomly the optimal forecast of next period's volatility is simply current actual volatility. This random walk model thus suggests that the optimal forecast of volatility is for no change since the last true observation. This model also provides us with an alternative benchmark for appraising the relative forecasting performance of methods considered here, being a standard comparative method in econometric forecast appraisal.

DSE has random walk with non stationary price movement. From the results it can be evident that average variance of the price is fluctuating time to time and following random movement over the year.

7.2.4. Exponential smoothing

Exponentially smoothing is a procedure for continually revising an estimate in the light of more recent experiences. This method is based on averaging (smoothing) past values of a series in a decreasing (exponential) manner. Observations are weighted with more weight being given to the more recent observations. The weighted used are A for the most recent observation, A (1-A) for the next most recent, A $(1-A)^2$ for the next and so forth.

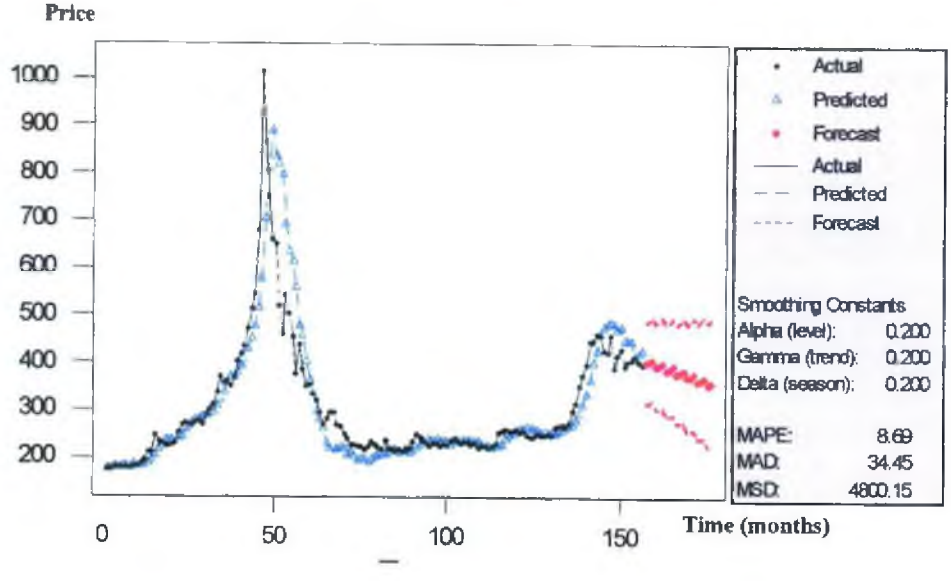
Analysis on the real prices of different periods (156 months) at different smoothing constant level provides relatively better forecasting. The value of A ranged 0.1 to 0.9. At A=0.9 level the forecasting error is minimum (1.95). Exponential smoothing method can be a good way of forecasting future DSE price since under this method stock price can

be clearly projected with minimum error. Appendix: Table - B3 represents the forecasted results for last 156 months and provides a basis for future forecasting.

7.2.5. Exponentially weighted moving average (EWMA)

The exponentially weighted moving average model is similar to the exponential smoothing model, but here past observed volatility is replaced by a moving average forecast.

In order to forecast the price of the upcoming years, Winter's Additive Model can be an effective tool since it considers both seasonality and trend of the variables. In the analysis of the DSE price volatility forecasting the value of the smoothing constants alpha (level), gamma (trend) and delta (seasonal) is 0.2. Under this method the level of volatility of upcoming 20 months price has been forecasted. The accuracy measures at this smoothing level the value of mean absolute percentage error (MAPE) is 8.69 and mean absolute deviation (MAD) is 34.45. Following figure represents the forecasted trends of prices of the sample companies for the upcoming periods.



7.2.6. Simple (mean) regression

The simple regression model provides one-step-ahead forecasts generated from the application of an in-sample estimated ordinary least squares of observed actual volatility upon immediately preceding actual volatility to out of sample data. Following Dimson

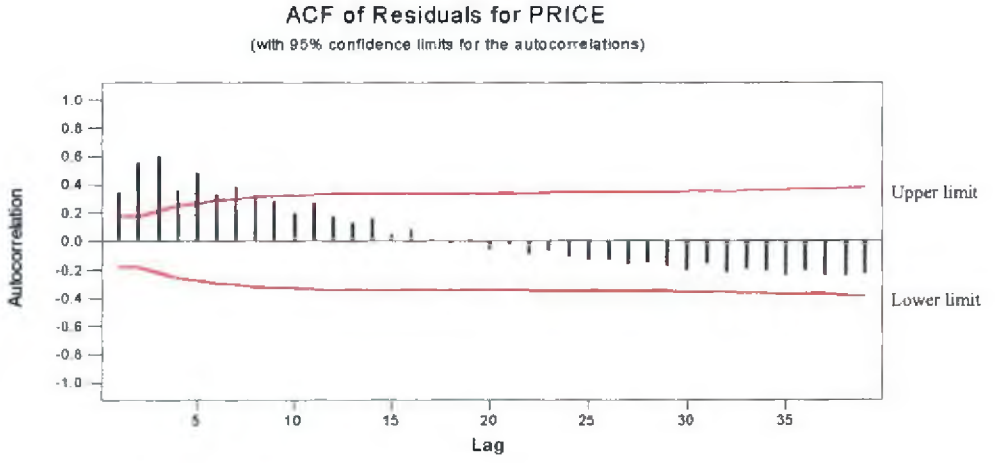
and Marsh (1990), again assuming the stationary of volatility over the longer term, if such forecast are to be unbiased then the simple regression implicitly forecasts volatility as a weighted sum of recent volatility and long run mean volatility and such that volatility will regress from its most recent level, σ^2_{t-1} towards its long run mean $\bar{h}$, with δ determining the speed of regression towards that mean.

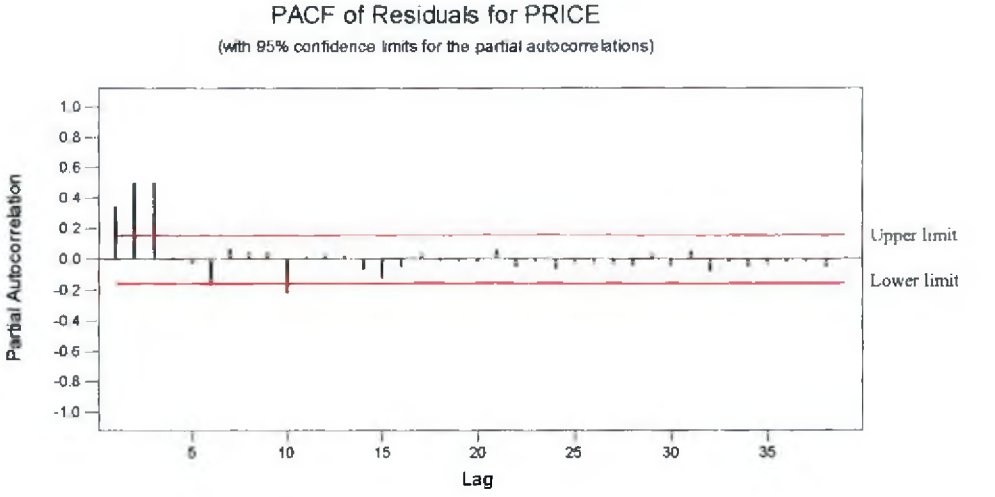
7.2.7. Autoregressive moving average (ARMA)

Linear models accounting for correlation between adjacent observations in a time series are known as autoregressive model. When the time lag is considered as zero i.e. first difference is zero then it is termed as autoregressive moving average (ARMA). This model has been applied on the average monthly price of all sample companies of Dhaka Stock Exchange and future price also forecasted. Forecasted results are presented in Appendix: Table - B5.

ARMA (0, 2)

If the correlation coefficient between current value and lag value is outside the confidence interval from -0.18 to +0.18 (red line) then it is considered that there is autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. The first panel of figure shown below represents that up-to 7 lags there is autocorrelations and thereafter no autocorrelation. From the second panel it reveals that there are autocorrelations up-to 3 lags, 6th lag and 10th lag and thereafter no autocorrelation

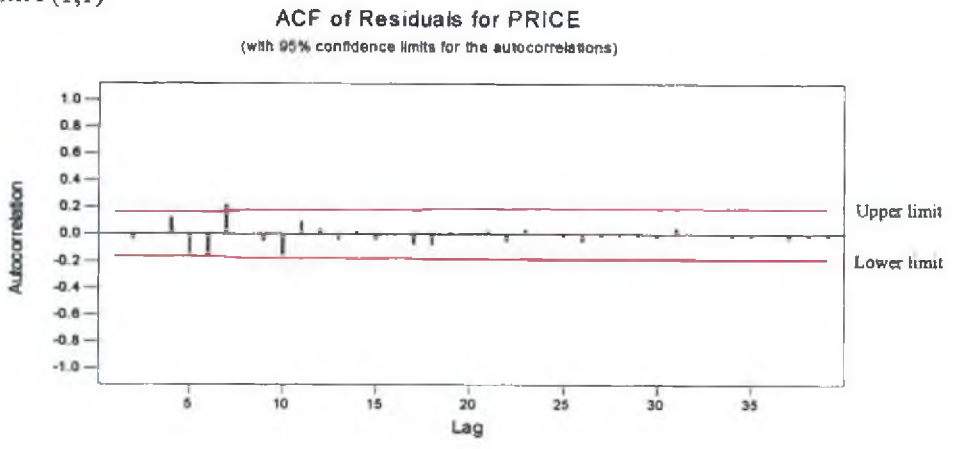


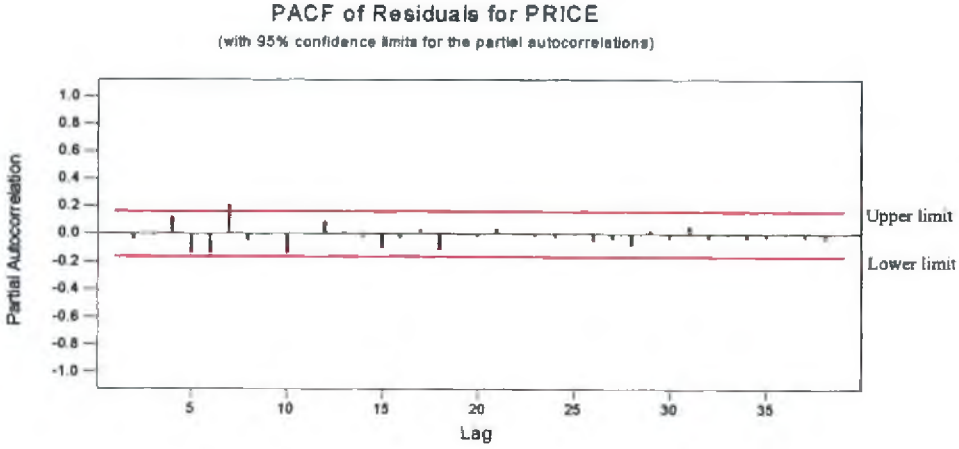


7.2.8. Autoregressive integrated moving average (ARIMA)

Linear models accounting for correlation between adjacent observations in a time series are known as autoregressive model. When the time lag is not considered as zero i.e. first difference is 1, 2, 3, and so on then it is termed as autoregressive integrated moving average (ARMA). This model has been applied on the average monthly price of all sample companies of Dhaka Stock Exchange and future price also forecasted. Forecasted results are presented in Appendix: Table – B6.

ARIMA (1,1)

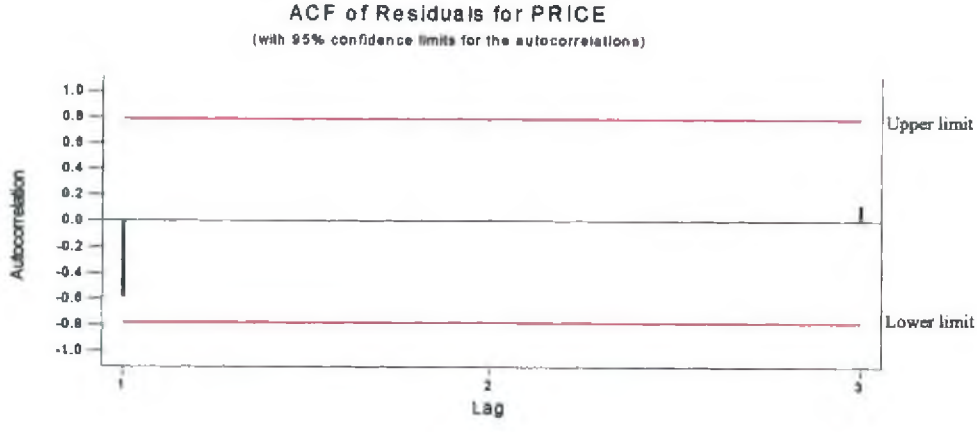


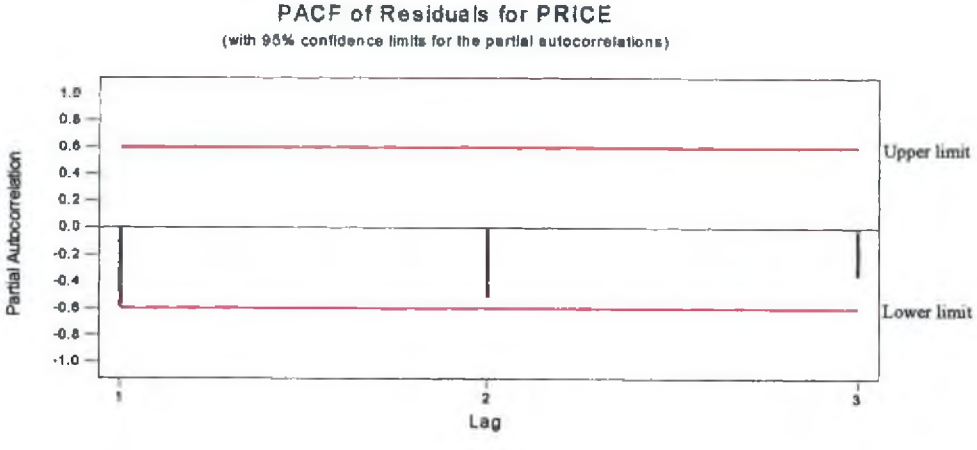


ARIMA (1, 1)

If the correlation coefficient between current value and lag value is outside the confidence interval from -0.18 to +0.18 (red line) for first panel then it is considered that there is autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. If the correlation coefficient between current value and lag value is outside the confidence interval from -0.18 to +0.18 (red line) for second panel then it is considered that there is autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. Both the panels indicate only autocorrelation in 7th lag.

ARIMA (1, 3)





If the correlation coefficient between current value and lag value is outside the confidence interval from -0.8 to +0.8 (red line) for first panel then it is considered that there is autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. If the correlation coefficient between current value and lag value is outside the confidence interval from -0.6 to +0.6 (red line) for second panel then it is considered that there is autocorrelation and if it is within the confidence interval then it is considered that there is no autocorrelation. Both the panels indicate no autocorrelation.

7.2.9. Test of mean reversion model of Campbell-Shiller:

Campbell-Shiller has shown that price and return revert to their long-run means. It is known as mean reversion that produces somewhat predictable price and return. The following figures present compiled data from 1993 to 2005 of average price of 126 listed companies of Dhaka Stock Exchange. The parallel line to the horizontal axis represents the historical average price and the fluctuating line represents the actual price. The actual price has a tendency to come to the historical average price line i. e., there is also existence of mean reversion in share prices of DSE.

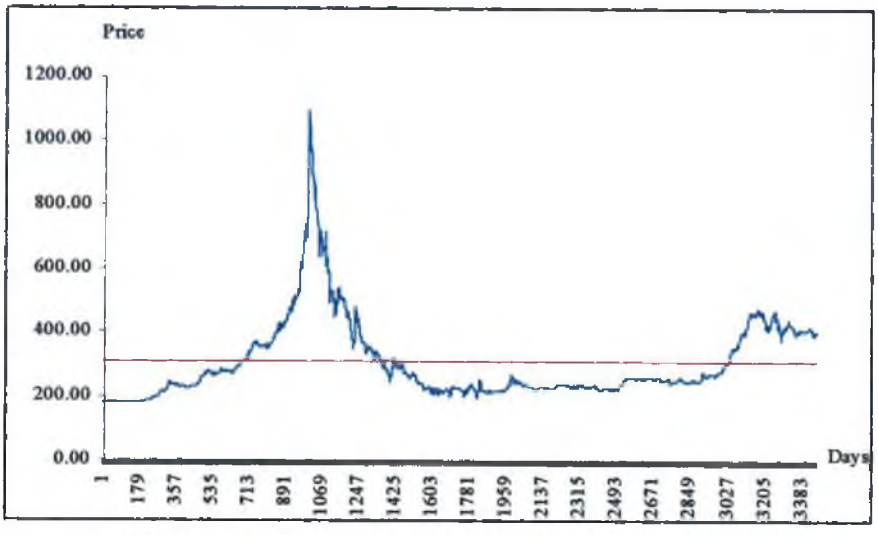


Figure : Average and actual price trend (Daily)

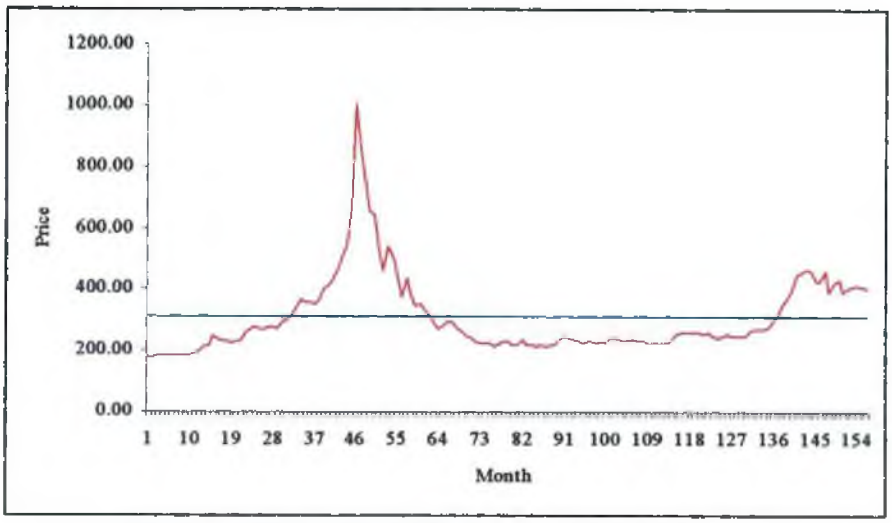


Figure : Average and actual price trend (Monthly)

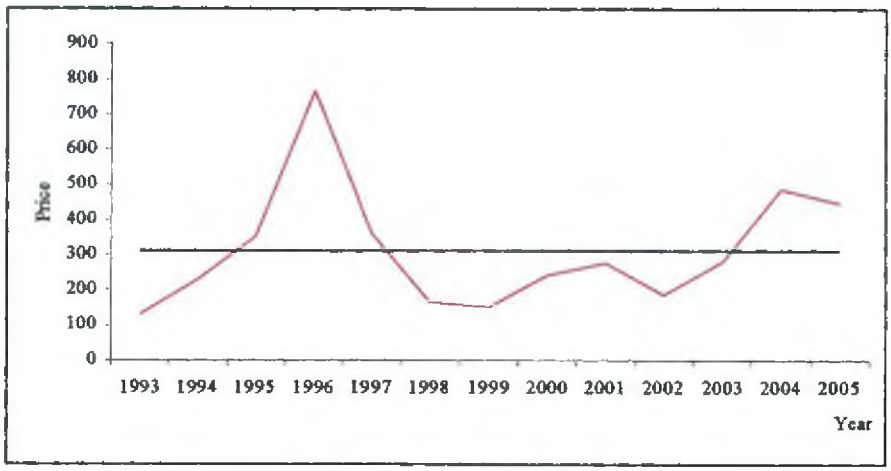


Figure : Average and actual price trend (Yearly)

7.2.10. Winter's model

Winter's three parameter linear and seasonal exponential smoothing model is an extension of Holt's Model that can reduce forecasting error. In order to forecast the price of the upcoming years Winter's additive model can be an effective tool since it considers both seasonality and trend of the variables. This model has been applied on the average price of all sample companies of Dhaka Stock Exchange for finding the past behavior of prices and for forecasting future price trend. The model results are shown in Appendix: Table - B4.

7.3. Forecast evaluation

In order to provide a measure of true volatility against which to assess the forecast performance of the volatility estimators, here it is followed Pagan and Schwert (1990) in using the squared error term from a conditional mean model for returns estimated over the full data set comprising both the in-sample and out-of –sample data. That is 'true' volatility generated by:

$$s_t^2 = \left(r_t - \left\{\pi_\tau - \left[\left(\theta_{t,\tau}(L) - 1\right)r_t\right]\right\}\right)$$

Where the subscript t on a coefficient indicates that it is estimated over the entire data sample. The ability of the above models to adequately forecast true volatility so measured in the DSE can be evaluated using the mean error (ME), root mean squared error (RMSE) and mean absolute error (MAE), defined as follows:

$$ME = \frac{1}{\tau}\sum_{t=T+1}^{T+\tau}\left(h_t - s_t^2\right)$$

$$MAE = \frac{1}{\tau}\sum_{t=T+1}^{T+\tau}\left|h_t - s_t^2\right|$$

$$RMSE = \sqrt{\frac{1}{\tau}\sum_{t=T+1}^{T+\tau}\left(h_t - s_t^2\right)}$$

Where τ is the number of forecast data points and s_t^2 is true volatility as defined above. The ME statistic is used here as a general guide to the direction of over or under perdition on average. The MAE is an orthodox forecast appraisal criterion which does not permit the offsetting effects of over prediction and under prediction as in ME, while the RMSE is a conventional criterion which clearly weights greater forecast errors more heavily in the average forecast error penalty.

These error statistics assume the underlying loss function to be symmetric. However as noted in the introduction, it is probable that as a practical matter not all investors will attach equal weight to similar sized over predictions and underproductions of volatility . Following previous research (Pagan and Schwert, 1990; Brailsford and Faff, 1996) it is also considered error statistics designed to account for potential asymmetry in the loss function. That is mean mixed error statistics which penalize, firstly under predictions more heavily:

$$MME(U) = \frac{1}{\tau}\left[\sum_{t=1}^{0}\left|h_t - s_t^2\right| + \sum_{t=1}^{U}\sqrt{\left|h_t - s_t^2\right|}\right]$$

and secondly, over predictions more heavily:

$$MME(o) = \frac{1}{\tau}\left[\sum_{t=1}^{0}\left|h_t - s_t^2\right| + \sum_{t=1}^{U}\sqrt{\left|h_t - s_t^2\right|}\right]$$

Where O denotes the number of over predictions and U the number of under predictions among the out -of- sample forecasts. Finally and again following previous research it is also reported that standardized values for all error statistics using the error statistic for the historical mean benchmark for each series. This has the advantage of allowing the error statistics to be more easily interpreted in relative context.

Summary of forecasted results

Model	Past result (156)	Forecasted result (157)	Forecast Error (SD)
Historical mean	398.16	396.58	903.00
Moving average	398.16	866.04	576.96
Exponential smoothing average	398.16	273.73	66.89
Winters' model	398.16	401.09	168.82
Autoregressive moving average	398.16	332.13	218.79
Autoregressive integrated moving average	398.16	399.11	157.61

7.4. Comparison of volatility of emerging markets

For measuring the volatility of different emerging markets monthly index data for the last 13 years (1993-2005) has been considered. At first variance has been estimated by considering every four months' index of different markets. Secondly, moving average has been estimated by taking 4 lags of preceding estimate of variance. Finally average volatility of the markets has been calculated for comparison (Appendix-B7).

The following table shows the country wise average index and estimated average volatility. From the table it reveals that there is the lowest index ($18.72) in Bangladesh and highest index in Philippines ($301.43). The lowest level of volatility is viewed in Bangladesh (DSE) ($15.19) and highest level of volatility exists in Indonesian market ($1247.99).

Table – 7.2: Comparison of volatility of emerging markets

Country	Average index ($) (1993-2005)	Moving average of index volatility (Variance)
Bangladesh	**1007.25 (Tk.) 18.72 ($)**	**15.19**
China	43.67	32.24
India	124.72	99.43
Indonesia	278.44	1247.99
Jordan	101.26	53.45
Korea	139.02	140.60
Malaysia	236.65	422.50
Pakistan	82.47	67.22
Philippines	**301.43**	**1063.20**
Sri Lanka	93.62	94.54
Taiwan	250.84	486.09
Thailand	225.60	666.63
Turkey	202.91	1082.01

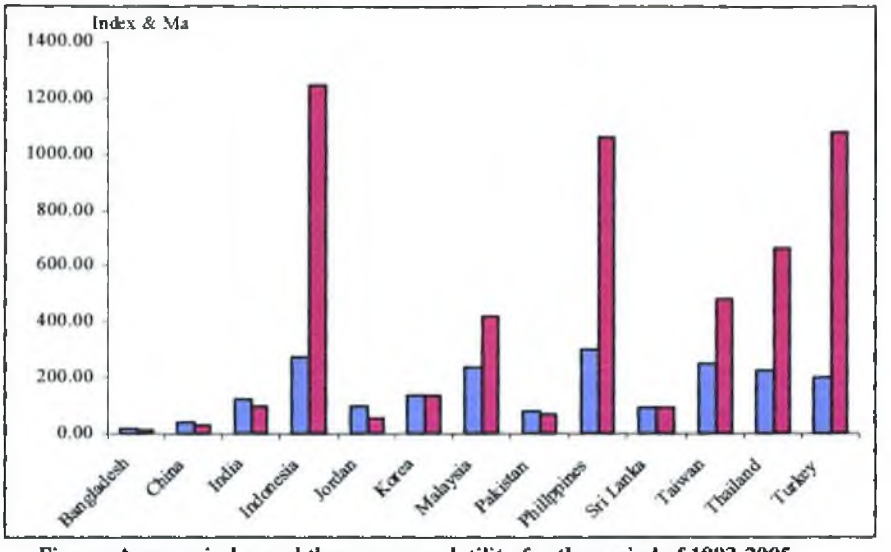


Figure: Average index and the average volatility for the period of 1993-2005

7.5. Conclusion

By applying the above different models the present volatility of price of shares has been estimated and future share price of Dhaka Stock Exchange has been forecasted. Different models have provided different results for different periods. Out of all mentioned models exponential smoothing method has provided the best outcome and it can be a good model for forecasting DSE price since under this method stock price can be clearly projected with minimum standard deviation.

CHAPTER- EIGHT

SUMMARY AND CONCLUSION

8.1. Findings

From the study it is observed that the stock market in our country is very much fluctuating and not accurately predictable. The price of shares exchanged in Dhaka Stock Exchange is also volatile at very high rate. Many of the stock market characteristics and macroeconomic variables are affecting the price of shares in DSE. Some of the variables have significant impact and some of variables have insignificant impact. It reveals from the study that a company's share price is mainly affected by number of listed companies, volume of listed securities, number of initial public offerings, earnings per share and dividend per share significantly. In macro aspect the price is influenced by growth rate, import volume, export volume, foreign exchange reserve, rate of inflation, money supply (broad money& narrow money) and advance interest rate. Rate of return calculated by considering the percentage change in price and percentage of dividend paid in case of annual data and only percentage of price change in case of monthly data also influenced by both stock market characteristics and macro factors. The important stock market characteristics are book value per share and price-earnings ratio. The important macroeconomic variables are money supply, growth rate, rate of inflation and deposit interest rate. The mentioned independent variables affecting share price and return have no multicollinearity problem and aotucorrelation problem, but the disturbance terms have heteroscedasticity problem i.e. they are non-stationary. Based on the major factors influencing share price and return significantly future stock market can be forecasted. Out all available market forecasting models, exponential smoothing average provides the best result in our market because it has the lowest level of forecasting error. By conducting normality test on monthly average prices of 126 companies listed in DSE, on all share price index and rate of return it is found that these variables have no normal trend. If the outlier of DSE 1996 is excluded from the observation then the non-normality of the market is lower than previous one.

From the part of theoretical analysis the most important identified drawbacks related to stock market of Bangladesh are not holding annual general meeting (AGM) and declaring dividend regularly, lack of liquidity and investors' confidence in the stock

market, thinly traded market because of lower number of listed companies compare to total companies operating in the country and lower amount of market capitalization and turnover as well. Other problems are number of state owned companies is relatively large, there is no effective structure of internal audit review and report on internal control and other operations, audit reports are not unqualified, financial reporting of most of the companies is faulty, there is no audit committee in most of the companies, non-permission of investment of fund for banks, insurance companies and cooperative societies, asymmetric information for poor communication and uneven disclosure by companies, state bureaucratic control and industrial autarky towards market oriented liberalizing policy reforms, exercise of control in the board of family members i.e. family-owned enterprises, for holding majority shares by family members for exercising control, few shares are traded in the market and some of the brokers are trading on their own accounts etc.

The important findings/contributions of this study can be pointed out in the following way:

1. This study revealed that the stock price is highly affected by major five stock market characteristics such as number of listed companies, volume of listed securities, number of initial public offerings, earning per share and dividend per share.
2. From the view point of macroeconomic variables this study identified that stock price is significantly influenced by growth rate, amount of import, amount of export, amount of foreign exchange reserve, rate of inflation, volume of money supply, interest rate on advances, and level of consumption.
3. This study documented that return from investment in stock is affected by book value per share and price-earnings ratio.
4. This study found that rate of return is determined by level of money supply, deposit interest rate, growth rate and rate of inflation.
5. It is identified in this study that there are no multicollinearity and autocorrelation problems, there is important contribution to explain the variance of dependent variable by independent variables and there is problem of heteroscedasticity in the variables used for DSE.
6. Stock price and rate of return of DSE are significantly volatile.

7. Exponential smoothing model has provided the best forecasting result for DSE stock price with minimum error.

8.2. Recommendations

For maintaining stability in the price and return of the stock market some necessary steps can be taken such as implementation of appropriate regulations and standards covering rules of conduct of stockholders, accounting and auditing standards, to make public aware, to develop and implement of governance structure, to enforce regulation, to ensure financial transparency, to restrict financial malpractice, to conduct rigorous audit by independent auditors, to improve legal system and judicial enforcement capacity of the country and to improve the confidence of general public through different campaign. Corporate financial disclosure is a fundamental pre-requisite for a healthy equity market. To protect investors, full and accurate accounts and adequate financial statement of affairs are of prime importance. Some incentives to the companies should be given for inducing full disclosure of financial information particularly for disclosure of material information, sustaining and strengthening investors' confidence. Investment companies operating as intermediary between ordinary investors and the capital market should be encouraged to come up in line with the practices like others countries. Along with these, Securities and Exchange Commission, Dhaka Stock Exchange Ltd. and Chittagong Stock Exchange must be more vigilant and active for adopting necessary rules regarding transactions related to capital market. Support from the part of the government is also essential for ensuring fairness and transparency of the market.

8.3. Conclusion

With the liberalization policy followed by the govt. the market has witnessed continuous development over the years. All the parameters performed more or less on the positive direction i.e., aggregate value of traded securities continued to rise from Tk.403.61mil. (1993) to Tk.64860 mil. (2005) with rising market capitalization from Tk.18098.7 mil. (1993) to Tk.234211.7 mil (2005). However, a big share market scam took place in October 1996, when manipulators from both home and abroad siphoned off over Tk.5000.00 crores from mainly smaller investors and banks (Haque, 2004 & Chowdhury2006). Apart from that the market is growing in size and moving up steadily. For last few years, there is more or less stable position in trading volume and all

share price index in the market. Moreover, the recent developments are the introduction of automated trading system and central depository system. The introduction of CDS has eliminated the labor-intensive nature of the previous settlements by ending the physical delivery and execution of transfer deeds. Newly introduced system also helps to reduce the risk of loss and duplication of papers.

Stock market of Bangladesh is in its infant stage compare to world capital market. But it has great potentiality. Larger size of ICB unit fund and oversubscription of almost all new issues indicate the same. Besides, investment possibilities are very bright for the insurance company's fund, pension fund, provident fund etc. From the standpoint of economic growth the primary market and the secondary market are playing important role by transferring money from some investors to others through the purchase and sale of existing scripts. The major portion of the operations of the primary market leads to a net increase in the volume of mobilized savings available for capital financing.

Presently there are some problems existing in DSE and stock price is significantly volatile. Government and other regulatory bodies are taking different positive initiatives for developing the capital market and ensuring transparency about all information. So it can be said that there is potentiality of earning positive return by making investment in stocks. The findings of this study and positive attitudes of different corners about recommendations will benefit the investors to judge the return behavior of leading companies, more precisely the risk averse investors, as they usually prefer to invest in blue chips. Empirical studies have been conducted on market efficiency, stock price behavior, dividend behavior, cum-dividend and ex-dividend impact on price, IPO pricing etc in DSE. But no research has been performed on stock market volatility. This study is certainly a new dimension of stock market. Further studies can be conducted on price and return behavior of stocks listed in DSE as well as volatility forecasting by incorporating other explanatory variables and qualitative factors.

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Appendix –A

SPSS results of multiple regression analysis for formulating model.

Step – 1:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.997(a)	.994	.934	45.20716	.994	16.346	11	1	.191	2.591

a Predictors: (Constant), DPR, MCAP, IPOS, MBRTO, EPS, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	367478.039	11	33407.094	16.346	.191(a)
	Residual	2043.687	1	2043.687		
	Total	369521.726	12			

a Predictors: (Constant), DPR, MCAP, IPOS, MBRTO, EPS, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	896.83	586.88		1.528	.369		
	LSTC	-1.433	1.783	-.394	-.804	.569	.023	43.366
	LSTS	.232	.254	.538	.913	.529	.016	62.804
	MCAP	.002	.001	.778	3.596	.173	.118	8.457
	IPOS	-9.136	7.406	-.395	-1.234	.434	.054	18.509
	BVPS	1.079	.840	.248	1.284	.421	.148	6.734
	EPS	-3.758	8.903	-.171	-.422	.746	.034	29.819
	DPS	-18.07	21.703	-.640	-.833	.558	.009	106.714
	PERTO	3.719	1.481	.687	2.511	.241	.074	13.522
	DYLD	-73.94	22.153	-.593	-3.338	.185	.175	5.699
	MBRTO	-51.57	53.011	-.488	-.973	.509	.022	45.415
	DPR	109.48	53.259	.241	2.056	.288	.401	2.491

a Dependent Variable: PRICE

Collinearity Diagnostics (a)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions											
				Constant	LSTC	LSTS	MCAP	IPOS	BVPS	EPS	DPS	PERTO	DYLD	MBRTO	DPR
	1	9.74	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	0.96	3.182	0	0	0	0	0	0	0	0	.02	0	0	0
	3	0.46	4.599	0	0	0	.02	0	0	0	0	0	0	0	.02
	4	0.32	5.509	0	0	0	0	.02	0	0	0	0	0	.01	.02
	5	0.21	6.902	0	0	0	.04	0	0	.02	0	0	.01	0	.04
	6	0.17	7.522	0	0	0	.01	.01	0	0	0	.02	0	0	.35
	7	0.07	11.437	0	0	0	.04	.02	.03	0	0	0.16	.03	.02	.05
	8	0.03	17.823	0	.01	.01	0	.05	.19	.02	0	.01	0	0	0
	9	0.02	22.637	0	0	0.1	.55	0	.09	.03	0	.08	.01	0	.03
	10	0.01	35.399	0	.01	0	.01	.03	.43	.21	.01	.01	.86	0	.02
	11	0	58.357	0	0.1	.13	.04	0	.18	.06	0.2	.23	.01	.12	.14
1	12	0	202.35	.99	.89	.75	.27	.88	.06	.65	.78	.47	.08	.84	.34

a Dependent Variable: PRICE

Step – 2:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.985	.971	.827	73.07677	.971	6.720	10	2	.136	2.909

a Predictors: (Constant), MBRTO, IPOS, EPS, MCAP, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	358841.299	10	35884.130	6.720	.136(a)
	Residual	10680.427	2	5340.214		
	Total	369521.726	12			

a Predictors: (Constant), MBRTO, IPOS, EPS, MCAP, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	243.979	797.792		.306	.789		
	LSTC	.214	2.574	.059	.083	.941	.029	34.600
	LSTS	-.078	.331	-.181	-.236	.835	.025	40.678
	MCAP	.002	.001	.607	1.880	.201	.139	7.205
	IPOS	-1.367	10.295	-.059	-.133	.907	.073	13.689
	BVPS	.727	1.330	.167	.546	.640	.155	6.455
	EPS	-11.880	12.897	-.542	-.921	.454	.042	23.947
	DPS	13.548	24.750	.480	.547	.639	.019	53.110
	PERTO	2.206	2.077	.407	1.062	.399	.098	10.184
	DYLD	-70.876	35.728	-.568	-1.984	.186	.176	5.673
	MBRTO	18.701	65.499	.177	.286	.802	.038	26.533

a Dependent Variable: PRICE

Collinearity Diagnostics (a)

Model	Dimension	Eigenvalue	Condition index	Variance Proportions										
				Constant	LSTC	LSTS	MCAP	IPOS	BVPS	EPS	DPS	PERTO	DYLD	MBRTO
1	1	8.98	1	0	0	0	0	0	0	0	0	0	0	0
	2	0.936	3.098	0	0	0	0	0	0	0	0	0.03	0	0
	3	0.43	4.57	0	0	0	0.03	0	0	0.01	0	0.01	0.01	0
	4	0.31	5.378	0	0	0	0.01	0.03	0	0	0	0	0	0.01
	5	0.201	6.688	0	0	0	0.07	0	0.01	0.03	0	0	0.01	0
	6	0.08	10.6	0	0	0	0.04	0.03	0.03	0	0	0.24	0.02	0.02
	7	0.031	17.11	0	0.01	0.02	0	0.07	0.19	0.02	0	0.02	0	0
	8	0.02	21.15	0	0	0.13	0.57	0	0.11	0.04	0.01	0.08	0.01	0.01
	9	0.008	33.43	0.01	0.01	0.02	0.04	0.03	0.41	0.23	0.03	0	0.85	0
	10	0.004	50.02	0	0.09	0.21	0.09	0	0.24	0.1	0.31	0.34	0	0.21
	11	0	158.9	0.99	0.9	0.62	0.17	0.84	0.02	0.57	0.65	0.29	0.1	0.73

a Dependent Variable: PRICE

Step – 3:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.790	.625	.599	82.53674	.625	24.144	10	145	.000	.425

a Predictors: (Constant), MBRTO, IPOS, EPS, MCAP, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1644748.792	10	164474.879	24.144	.000(a)
	Residual	987785.430	145	6812.313		
	Total	2632534.222	155			

a Predictors: (Constant), MBRTO, IPOS, EPS, MCAP, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	564.458	262.012		2.154	.033		
	LSTC	-1.486	.844	-.529	-1.761	.080	.029	34.925
	LSTS	-.152	.109	-.456	-1.393	.166	.024	41.379
	MCAP	.001	.000	.747	5.456	.000	.138	7.242
	IPOS	-3.018	3.373	-.169	-.895	.372	.072	13.816
	BVPS	-1.225	.431	-.366	-2.843	.005	.156	6.391
	EPS	8.795	4.233	.520	2.078	.039	.041	24.209
	DPS	10.230	8.172	.469	1.252	.213	.018	54.197
	PERTO	-.689	.676	-.165	-1.020	.310	.099	10.136
	DYLD	-24.796	11.636	-.259	-2.131	.035	.175	5.709
	MBRTO	35.414	21.498	.434	1.647	.102	.037	26.804

a Dependent Variable: PRICE

Correlation Matrix

		PRICE	LSTC	LSTS	MCAP	IPOS	BVPS	EPS	DPS	PERTO	DYLD	MBRTO
Pearson Correlation	PRICE	1	0.08	0.12	0.545	0.31	-.24	0.18	-.04	0.6	-0.5	0.415
	LSTC		1	0.87	0.569	-0.4	0.58	0.85	0.79	-0.2	0.08	-0.21
	LSTS			1	0.699	-0.3	0.6	0.73	0.88	-0.2	0.22	-0.18
	MCAP				1	0.04	0.16	0.45	0.53	0.39	-0	0.134
	IPOS					1	-.46	0	-.22	0.55	-0.7	-0.03
	BVPS						1	0.6	0.6	-0.3	0.45	-0.03
	EPS							1	0.69	0.05	-0.2	-0.09
	DPS								1	-0.2	0.3	-0.52
	PERTO									1	-0.5	0.571
	DYLD										1	-0.23
	MBRTO											1

Dependent Variable: PRICE

Step – 4:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin - Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.203	0.041	-0.025	7.433	0.041	0.622	10	145	0.793	1.728

a Predictors: (Constant), MCAP, IPOS, MBRTO, EPS, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	343.60	10	34.36	0.622	.793(a)
	Residual	8012.12	145	55.256		
	Total	8355.72	155			

a Predictors: (Constant), MCAP, IPOS, MBRTO, EPS, BVPS, PERTO, DYLD, LSTS, LSTC, DPS
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	1.027	.618		1.661	.099		
	LSTC	-.926	.733	-.279	-1.263	.209	.136	7.373
	LSTS	.148	.240	.272	.616	.539	.034	29.578
	MCAP	.001	.064	.002	.010	.992	.169	5.901
	IPOS	.002	.027	.017	.078	.938	.146	6.852
	BVPS	0.32	.081	.097	.394	.695	.110	9.119
	EPS	.012	.087	.031	.135	.893	.121	8.277
	DPS	-.291	.375	-.325	-.775	.439	.038	26.566
	PERTO	.084	.122	.355	.687	.493	.025	40.375
	DYLD	-.013	.205	-.017	-.061	.951	.087	11.474
	MBRTO	-.090	.113	-.378	-.791	.430	.029	34.574

a Dependent Variable: PRICE

Collinearity Diagnostics (a)

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions										
				Constant	LSTC	LSTS	MCAP	IPOS	BVPS	EPS	DPS	PERTO	DYLD	MBRTO
	1	3.14	1.00	.01	.01	.00	.01	.00	.00	.00	.00	.00	.00	.00
	2	2.84	1.05	.00	.00	.00	.01	.00	.01	.01	.00	.00	.01	.00
	3	1.93	1.27	.00	.00	.00	.00	.02	.00	.00	.00	.00	.01	.00
	4	.985	1.78	.65	.01	.00	.00	.00	.00	.00	.00	.00	.01	.00
	5	.829	1.94	.30	.03	.00	.00	.03	.01	.00	.00	.00	.01	.00
	6	.560	2.36	.01	.03	.01	.00	.03	.01	.08	.00	.00	.00	.00
	7	.290	3.29	.00	.16	.00	.03	.04	.03	.08	.01	.00	.04	.00
	8	.225	3.73	.00	.00	.01	.37	.06	.02	.01	.00	.00	.00	.03
	9	.170	4.29	.02	.03	.00	.06	.01	.28	.00	.02	.00	.16	.00
	10	.033	9.78	.00	.06	.04	.40	.81	.00	.36	.26	.23	.02	.03
1	11	.007	20.5	.01	.67	.92	.12	.00	.64	.45	.70	.76	.75	.93

a Dependent Variable: PRICE

Step – 5:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.725(a)	.525	.512	91.00607	.284

a Predictors: (Constant), DYLD, MCAP, BVPS, EPS
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1381936.266	4	345484.066	41.715	.000(a)
	Residual	1250597.956	151	8282.106		
	Total	2632534.222	155			

a Predictors: (Constant), DYLD, MCAP, BVPS, EPS
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	434.603	29.317		14.824	.000		
	MCAP	.001	.000	.624	9.339	.000	.706	1.417
	BVPS	.011	.374	.003	.030	.976	.252	3.962
	EPS	-3.423	1.904	-.202	-1.798	.074	.248	4.030
	DYLD	-46.650	8.642	-.487	-5.398	.000	.386	2.590

a Dependent Variable: PRICE

Correlations Matrix

		PRICE	MCAP	BVPS	EPS	DYLD
Pearson Correlation	PRICE	1.000	.545	-.240	.184	-.457
	MCAP		1.000	.156	.448	-.024
	BVPS			1.000	.604	.449
	EPS				1.000	-.215
	DYLD					1.000

Dependent Variable: PRICE

Step – 6:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.725(a)	.525	.516	90.70648	.284

a Predictors: (Constant), DYLD, MCAP, EPS
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1381929.016	3	460643.005	55.987	.000(a)
	Residual	1250605.206	152	8227.666		
	Total	2632534.222	155			

a Predictors: (Constant), DYLD, MCAP, EPS
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	434.518	29.078		14.943	.000		
	MCAP	.001	.000	.623	9.928	.000	.794	1.260
	EPS	-3.377	1.086	-.200	-3.109	.002	.757	1.320
	DYLD	-46.454	5.499	-.485	-8.447	.000	.947	1.056

a Dependent Variable: PRICE

Correlation Matrix

		PRICE	MCAP	EPS	DYLD
Pearson Correlation	PRICE	1.000	.545	.184	-.457
	MCAP		1.000	.448	-.024
	EPS			1.000	-.215
	DYLD				1.000

Step – 7:

Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.125(a)	.016	-.004	7.35589	1.695

a Predictors: (Constant), DYLD, EPS, MCAP
b Dependent Variable: PRICE

ANOVA (b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	131.124	3	43.708	.808	.491(a)
	Residual	8224.597	152	54.109		
	Total	8355.721	155			

a Predictors: (Constant), DYLD, EPS, MCAP
b Dependent Variable: PRICE

Coefficients (a)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	Constant	.820	.598		1.372	.172		
	MCAP	.001	.030	.002	.026	.979	.775	1.291
	EPS	-.029	.033	-.079	-.888	.376	.824	1.213
	DYLD	-.052	.074	-.070	-.704	.483	.654	1.529

a Dependent Variable: PRICE

Correlation Matrix

		PRICE	MCAP	EPS	DYLD
Pearson Correlation	PRICE	1.000	.040	-.107	-.103
	MCAP		1.000	-.073	-.459
	EPS			1.000	.400
	DYLD				1.000

Regression Analysis: PRICE versus list. comp., Listed secur, IPOs, EPS

```
The regression equation is
PRICE = 132 + 0.242 list. comp. + 0.0471 Listed securities + 6.84 IPOs
          + 0.12 EPS

Predictor        Coef     SE Coef          T        P
Constant        132.1       123.9       1.07    0.288
list. co       0.2416      0.6841       0.35    0.724
Listed s      0.04708     0.05174       0.91    0.364
IPOs            6.837       1.815       3.77    0.000
EPS             0.123       3.004       0.04    0.968

S = 122.1       R-Sq = 14.5%      R-Sq(adj) = 12.2%

Analysis of Variance
Source            DF          SS          MS          F        P
Regression         4      380519       95130       6.38    0.000
Residual Error   151     2252016       14914
Total            155     2632534

Durbin-Watson statistic = 0.13
```

Appendix-B

Table- B1

Historical mean

Year	Month	Sequence	Price	Variance
1993	January	1	177.05	
	February	2	176.49	
	March	3	179.99	
	April	4	179.27	2.85
	May	5	178.53	2.27
	June	6	179.64	0.39
	July	7	180.25	0.52
	August	8	179.56	0.51
	September	9	181.60	0.88
	October	10	183.53	3.05
	November	11	188.10	13.29
	December	12	194.98	35.39
1994	January	13	211.29	147.83
	February	14	211.75	141.01
	March	15	246.77	476.14
	April	16	235.63	314.29
	May	17	230.28	213.67
	June	18	227.72	71.36
	July	19	224.17	23.24
	August	20	227.18	6.29
	September	21	229.99	5.74
	October	22	254.78	197.04
	November	23	271.25	441.73
	December	24	272.35	391.05
1995	January	25	270.38	69.10
	February	26	270.59	0.78
	March	27	278.10	13.01
	April	28	277.15	17.14
	May	29	271.57	14.59
	June	30	292.50	79.66
	July	31	302.04	195.35
	August	32	312.88	308.14
	September	33	339.99	421.24
	October	34	370.93	947.17
	November	35	357.91	631.64
	December	36	360.29	164.91
1997	January	49	662.21	22406.77
	February	50	649.85	29414.93
	March	51	520.01	19811.31
	April	52	463.50	9552.64
	May	53	544.61	6086.10

	June	54	503.97	1160.34
	July	55	455.29	1690.25
	August	56	379.06	5068.38
	September	57	440.69	2650.09
	October	58	387.22	1448.55
	November	59	351.42	1394.85
	December	60	355.43	1700.45
1998	January	61	336.88	449.77
	February	62	320.94	245.35
	March	63	295.19	651.52
	April	64	269.80	867.91
	May	65	283.78	469.07
	June	66	297.98	164.45
	July	67	297.53	179.08
	August	68	269.93	177.57
	September	69	267.74	279.59
	October	70	250.83	373.82
	November	71	242.72	173.97
	December	72	229.73	253.02
1999	January	73	227.49	121.78
	February	74	226.48	56.78
	March	75	226.25	2.52
	April	76	217.08	23.64
	May	77	223.64	19.22
	June	78	233.90	48.42
	July	79	229.26	52.76
	August	80	222.34	28.47
	September	81	219.68	42.02
	October	82	237.37	62.64
	November	83	220.82	68.64
	December	84	217.37	83.81
2000	January	85	215.77	98.38
	February	86	217.40	4.53
	March	87	215.26	1.21
	April	88	218.10	1.79
	May	89	221.63	7.00
	June	90	235.13	77.38
	July	91	251.91	235.59
	August	92	245.39	174.44
	September	93	239.10	54.06
	October	94	232.51	69.34
	November	95	225.58	72.63
	December	96	230.97	30.95
2001	January	97	230.99	9.23
	February	98	225.73	9.45
	March	99	229.07	6.14
	April	100	227.60	4.98
	May	101	239.47	37.92

	June	102	240.30	44.94
	July	103	236.65	33.83
	August	104	231.54	15.64
	September	105	234.29	13.78
	October	106	233.45	4.49
	November	107	227.83	8.24
	December	108	230.07	9.01
2002	January	109	222.21	22.30
	February	110	223.96	12.82
	March	111	224.82	11.45
	April	112	222.44	1.56
	May	113	224.80	1.25
	June	114	231.20	14.16
	July	115	254.67	217.16
	August	116	257.81	274.35
	September	117	260.03	177.79
	October	118	256.55	5.07
	November	119	257.51	2.17
	December	120	260.25	3.39
2003	January	121	253.95	6.77
	February	122	258.44	7.01
	March	123	247.82	30.69
	April	124	243.79	42.04
	May	125	245.23	43.88
	June	126	252.45	14.47
	July	127	249.11	15.31
	August	128	247.39	9.30
	September	129	249.80	4.42
	October	130	248.26	1.09
	November	131	264.17	62.49
	December	132	268.01	99.81
2004	January	133	270.86	101.78
	February	134	268.64	7.75
	March	135	274.99	9.95
	April	136	298.09	183.72
	May	137	314.76	452.35
	June	138	350.15	1000.62
	July	139	374.42	1184.55
	August	140	396.78	1233.49
	September	141	446.41	1681.02
	October	142	447.31	1334.31
	November	143	462.66	821.42
	December	144	457.85	63.86
2005	January	145	425.06	279.51
	February	146	423.46	436.19
	March	147	459.08	390.60
	April	148	389.63	804.21
	May	149	415.67	821.54

	June	150	429.38	836.22
	July	151	393.83	350.35
	August	152	403.64	235.99
	September	153	407.44	225.27
	October	154	412.78	63.94
	November	155	404.29	17.41
	December	156	398.16	37.31
Historical mean of variances				902.91

Appendix: Table –B2

Moving average model

Year	Month	Price	Variance	Moving average	Forecast	Forecasting error
1993	January	177.05	-	-		
	February	176.49	0.16	-		
	March	179.99	6.11	3.13	179.63	0.36
	April	179.27	0.26	3.19	183.17	-3.91
	May	178.53	0.27	0.27	179.53	-1.01
	June	179.64	0.62	0.45	178.97	0.67
	July	180.25	0.19	0.40	180.04	0.21
	August	179.56	0.24	0.21	180.47	-0.91
	September	181.60	2.07	1.15	180.72	0.88
	October	183.53	1.87	1.97	183.56	-0.03
	November	188.10	10.44	6.15	189.68	-1.58
	December	194.98	23.70	17.07	205.17	-10.19
1994	January	211.29	132.96	78.33	273.31	-62.02
	February	211.75	0.11	66.53	277.82	-66.07
	March	246.77	613.05	306.58	518.33	-271.56
	April	235.63	62.04	337.55	584.31	-348.69
	May	230.28	14.27	38.16	273.78	-43.50
	June	227.72	3.30	8.79	239.07	-11.35
	July	224.17	6.28	4.79	232.51	-8.33
	August	227.18	4.52	5.40	229.57	-2.39
	September	229.99	3.96	4.24	231.42	-1.42
	October	254.78	307.29	155.62	385.61	-130.83
	November	271.25	135.62	221.46	476.24	-204.99
	December	272.35	0.61	68.12	339.37	-67.01
1995	January	270.38	1.93	1.27	273.62	-3.24
	February	270.59	0.02	0.98	271.36	-0.77
	March	278.10	28.22	14.12	284.71	-6.61
	April	277.15	0.46	14.34	292.44	-15.30
	May	271.57	15.56	8.01	285.15	-13.58

	June	292.50	219.07	117.31	388.88	-96.38
	July	302.04	45.50	132.29	424.79	-122.75
	August	312.88	58.80	52.15	354.19	-41.30
	September	339.99	367.44	213.12	526.00	-186.01
	October	370.93	478.65	423.04	763.03	-392.10
	November	357.91	84.81	281.73	652.66	-294.75
	December	360.29	2.84	43.82	401.73	-41.44
1997	January	662.21	45576.80	22789.82	23150.11	-22487.90
	February	649.85	76.41	22826.60	23488.81	-22838.96
	March	520.01	8428.49	4252.45	4902.30	-4382.29
	April	463.50	1596.71	5012.60	5532.61	-5069.11
	May	544.61	3289.45	2443.08	2906.58	-2361.97
	June	503.97	825.68	2057.57	2602.18	-2098.20
	July	455.29	1184.87	1005.28	1509.25	-1053.96
	August	379.06	2905.77	2045.32	2500.62	-2121.55
	September	440.69	1899.01	2402.39	2781.45	-2340.76
	October	387.22	1429.49	1664.25	2104.94	-1717.72
	November	351.42	640.81	1035.15	1422.37	-1070.95
	December	355.43	8.04	324.42	675.84	-320.41
1998	January	336.88	171.97	90.00	445.43	-108.55
	February	320.94	127.12	149.55	486.43	-165.49
	March	295.19	331.52	229.32	550.26	-255.07
	April	269.80	322.23	326.88	622.07	-352.26
	May	283.78	97.65	209.94	479.74	-195.97
	June	297.98	100.84	99.25	383.02	-85.04
	July	297.53	0.10	50.47	348.45	-50.92
	August	269.93	380.77	190.44	487.97	-218.03
	September	267.74	2.41	191.59	461.52	-193.78
	October	250.83	143.00	72.70	340.44	-89.62
	November	242.72	32.83	87.92	338.75	-96.02
	December	229.73	84.44	58.63	301.36	-71.63
1999	January	227.49	2.51	43.47	273.20	-45.71
	February	226.48	0.51	1.51	229.00	-2.52
	March	226.25	0.03	0.27	226.75	-0.50
	April	217.08	42.09	21.06	247.31	-30.24
	May	223.64	21.54	31.82	248.89	-25.25
	June	233.90	52.65	37.10	260.74	-26.83
	July	229.26	10.76	31.70	265.61	-36.34
	August	222.34	23.94	17.35	246.61	-24.27
	September	219.68	3.55	13.75	236.09	-16.41
	October	237.37	156.58	80.06	299.74	-62.37
	November	220.82	136.94	146.76	384.13	-163.31
	December	217.37	5.96	71.45	292.28	-74.91
2000	January	215.77	1.27	3.62	220.99	-5.22
	February	217.40	1.33	1.30	217.08	0.33
	March	215.26	2.30	1.82	219.22	-3.96

	April	218.10	4.02	3.16	218.42	-0.33
	May	221.63	6.23	5.13	223.22	-1.60
	June	235.13	91.18	48.71	270.33	-35.20
	July	251.91	140.77	115.98	351.11	-99.20
	August	245.39	21.27	81.02	332.93	-87.54
	September	239.10	19.77	20.52	265.91	-26.81
	October	232.51	21.74	20.75	259.85	-27.35
	November	225.58	23.95	22.84	255.35	-29.76
	December	230.97	14.50	19.22	244.81	-13.84
2001	January	230.99	0.00	7.25	238.22	-7.23
	February	225.73	13.85	6.92	237.92	-12.19
	March	229.07	5.58	9.72	235.44	-6.37
	April	227.60	1.08	3.33	232.40	-4.80
	May	239.47	70.48	35.78	263.38	-23.91
	June	240.30	0.34	35.41	274.89	-34.59
	July	236.65	6.63	3.48	243.78	-7.13
	August	231.54	13.08	9.85	246.51	-14.97
	September	234.29	3.77	8.42	239.96	-5.68
	October	233.45	0.35	2.06	236.35	-2.90
	November	227.83	15.78	8.07	241.51	-13.69
	December	230.07	2.52	9.15	236.98	-6.91
2002	January	222.21	30.91	16.72	246.79	-24.58
	February	223.96	1.52	16.22	238.43	-14.47
	March	224.82	0.37	0.95	224.90	-0.08
	April	222.44	2.85	1.61	226.43	-4.00
	May	224.80	2.79	2.82	225.25	-0.46
	June	231.20	20.52	11.65	236.45	-5.25
	July	254.67	275.38	147.95	379.15	-124.48
	August	257.81	4.93	140.15	394.83	-137.01
	September	260.03	2.47	3.70	261.51	-1.48
	October	256.55	6.06	4.26	264.30	-7.75
	November	257.51	0.46	3.26	259.81	-2.30
	December	260.25	3.76	2.11	259.62	0.63
2003	January	253.95	19.85	11.80	272.06	-18.10
	February	258.44	10.05	14.95	268.90	-10.47
	March	247.82	56.40	33.22	291.66	-43.84
	April	243.79	8.10	32.25	280.06	-36.27
	May	245.23	1.04	4.57	248.36	-3.13
	June	252.45	26.07	13.55	258.78	-6.33
	July	249.11	5.58	15.83	268.28	-19.17
	August	247.39	1.47	3.53	252.64	-5.25
	September	249.80	2.91	2.19	249.58	0.22
	October	248.26	1.19	2.05	251.85	-3.59
	November	264.17	126.50	63.84	312.11	-47.94
	December	268.01	7.37	66.94	331.11	-63.10
2004	January	270.86	4.08	5.72	273.73	-2.87
	February	268.64	2.47	3.27	274.14	-5.50
	March	274.99	20.12	11.30	279.94	-4.95

	April	298.09	266.94	143.53	418.52	-120.43
	May	314.76	138.93	202.93	501.03	-186.26
	June	350.15	626.37	382.65	697.41	-347.26
	July	374.42	294.35	460.36	810.52	-436.10
	August	396.78	250.05	272.20	646.62	-249.84
	September	446.41	1231.36	740.70	1137.48	-691.08
	October	447.31	0.41	615.88	1062.29	-614.98
	November	462.66	117.91	59.16	506.46	-43.80
	December	457.85	11.56	64.73	527.40	-69.54
2005	January	425.06	537.66	274.61	732.47	-307.40
	February	423.46	1.28	269.47	694.53	-271.07
	March	459.08	634.12	317.70	741.16	-282.09
	April	389.63	2411.34	1522.73	1981.81	-1592.18
	May	415.67	339.02	1375.18	1764.81	-1349.14
	June	429.38	93.96	216.49	632.16	-202.78
	July	393.83	631.87	362.91	792.29	-398.46
	August	403.64	48.16	340.02	733.84	-330.20
	September	407.44	7.20	27.68	431.32	-23.89
	October	412.78	14.28	10.74	418.18	-5.40
	November	404.29	36.05	25.17	437.95	-33.66
	December	398.16	18.76	27.41	431.70	-33.53
					398.16	
					0.00	0.00
Average			578.57	578.53	866.04	-576.98

Table B3: Exponential Smoothing

Year	Serial	Price	0.1	error	0.2	error	0.3	error	0.4	error	0.5	error	0.6	error	0.7	error
1993	1	177.05	177.05	0.00												
	2	176.49	177.05	-0.56	177.05	-0.56	177.05	-0.56	177.05	-0.56	177.05	-0.56	177.05	-0.56	177.05	-0.56
	3	179.99	176.99	2.99	176.94	3.05	176.88	3.11	176.83	3.16	176.77	3.22	176.72	3.27	176.66	3.33
	4	179.27	177.29	1.97	177.55	1.72	177.82	1.45	178.09	1.17	178.38	0.88	178.68	0.59	178.99	0.27
	5	178.53	177.49	1.04	177.89	0.63	178.25	0.28	178.56	-0.04	178.82	-0.30	179.03	-0.51	179.18	-0.66
	6	179.64	177.59	2.04	178.02	1.62	178.33	1.31	178.55	1.09	178.67	0.96	178.73	0.91	178.72	0.92
	7	180.25	177.80	2.46	178.34	1.91	178.72	1.53	178.98	1.27	179.16	1.10	179.27	0.98	179.36	0.89
	8	179.56	178.04	1.52	178.73	0.84	179.18	0.38	179.49	0.07	179.71	-0.14	179.86	-0.30	179.99	-0.42
	9	181.60	178.20	3.40	178.89	2.70	179.30	2.30	179.52	2.08	179.63	1.96	179.68	1.91	179.69	1.91
	10	183.53	178.54	4.99	179.43	4.09	179.99	3.54	180.35	3.18	180.62	2.91	180.83	2.70	181.02	2.50
	11	188.10	179.04	9.06	180.25	7.84	181.05	7.05	181.62	6.47	182.07	6.02	182.45	5.65	182.78	5.32
	12	194.98	179.94	15.04	181.82	13.16	183.16	11.82	184.21	10.77	185.08	9.90	185.84	9.14	186.50	8.48
1994	13	211.29	181.45	29.84	184.45	26.84	186.71	24.58	188.52	22.77	190.03	21.26	191.32	19.96	192.44	18.85
	14	211.75	184.43	27.32	189.82	21.93	194.08	17.67	197.63	14.12	200.66	11.09	203.30	8.45	205.63	6.12
	15	246.77	187.16	59.60	194.21	52.56	199.38	47.38	203.28	43.49	206.21	40.56	208.37	38.39	209.91	36.85
	16	235.63	193.12	42.50	204.72	30.91	213.60	22.03	220.67	14.95	226.49	9.14	231.41	4.22	235.71	-0.08
	17	230.28	197.37	32.91	210.90	19.38	220.21	10.08	226.65	3.63	231.06	-0.77	233.94	-3.66	235.65	-5.37
	18	227.72	200.66	27.05	214.78	12.94	223.23	4.49	228.11	-0.39	230.67	-2.95	231.75	-4.03	231.89	-4.18
	19	224.17	203.37	20.80	217.36	6.81	224.58	-0.40	227.95	-3.78	229.19	-5.02	229.33	-5.16	228.97	-4.80
	20	227.18	205.45	21.73	218.73	8.45	224.45	2.72	226.44	0.74	226.68	0.49	226.23	0.94	225.61	1.57
	21	229.99	207.62	22.37	220.42	9.58	225.27	4.72	226.73	3.26	226.93	3.06	226.80	3.19	226.71	3.28
	22	254.78	209.86	44.92	222.33	32.45	226.69	28.09	228.04	26.74	228.46	26.32	228.71	26.07	229.01	25.78
	23	271.25	214.35	56.90	228.82	42.43	235.12	36.14	238.73	32.52	241.62	29.63	244.35	26.90	247.05	24.20
	24	272.35	220.04	52.31	237.31	35.04	245.96	26.40	251.74	20.61	256.44	15.92	260.49	11.86	263.99	8.36
1995	25	270.38	225.27	45.11	244.32	26.07	253.87	16.51	259.99	10.40	264.39	5.99	267.61	2.78	269.84	0.54
	26	270.59	229.78	40.81	249.53	21.06	258.83	11.76	264.15	6.44	267.39	3.20	269.27	1.32	270.22	0.37
	27	278.10	233.86	44.24	253.74	24.36	262.36	15.75	266.72	11.38	268.99	9.11	270.06	8.04	270.48	7.62
	28	277.15	238.29	38.86	258.61	18.53	267.08	10.07	271.27	5.87	273.55	3.60	274.89	2.26	275.82	1.33
	29	271.57	242.17	29.39	262.32	9.25	270.10	1.47	273.62	-2.05	275.35	-3.78	276.24	-4.67	276.75	-5.18
	30	292.50	245.11	47.39	264.17	28.33	270.54	21.96	272.80	19.70	273.46	19.04	273.44	19.06	273.12	19.38

	31	302.04	249.85	52.19	269.84	32.20	277.13	24.91	280.68	21.36	282.98	19.06	284.88	17.16	286.69	15.35
	32	312.88	255.07	57.81	276.28	36.61	284.60	28.28	289.22	23.66	292.51	20.37	295.17	17.71	297.43	15.45
	33	339.99	260.85	79.14	283.60	56.39	293.09	46.91	298.69	41.30	302.70	37.30	305.80	34.19	308.25	31.74
	34	370.93	268.77	102.17	294.88	76.06	307.16	63.77	315.21	55.72	321.34	49.59	326.32	44.62	330.47	40.46
	35	357.91	278.98	78.93	310.09	47.82	326.29	31.62	337.50	20.41	346.14	11.77	353.09	4.82	358.79	-0.88
	36	360.29	286.88	73.42	319.65	40.64	335.78	24.52	345.66	14.63	352.02	8.27	355.98	4.31	358.17	2.12
1997	49	662.21	294.22	367.99	327.78	334.43	343.13	319.08	351.51	310.69	356.16	306.05	358.57	303.64	359.66	302.55
	50	649.85	331.02	318.83	394.67	255.18	438.85	210.99	475.79	174.05	509.18	140.66	540.75	109.09	571.44	78.40
	51	520.01	362.90	157.11	445.70	74.31	502.15	17.86	545.41	-25.40	579.51	-59.50	606.21	-86.20	626.33	-106.31
	52	463.50	378.61	84.89	460.56	2.94	507.51	-44.01	535.25	-71.75	549.76	-86.26	554.49	-90.99	551.91	-88.40
	53	544.61	387.10	157.51	461.15	83.46	494.31	50.30	506.55	38.06	506.63	37.98	499.90	44.71	490.02	54.59
	54	503.97	402.85	101.12	477.84	26.13	509.40	-5.42	521.78	-17.80	525.62	-21.65	526.73	-22.75	528.24	-24.26
	55	455.29	412.96	42.33	483.07	-27.77	507.77	-52.48	514.66	-59.36	514.80	-59.50	513.08	-57.78	511.25	-55.96
	56	379.06	417.20	-38.13	477.51	-98.45	492.03	-112.97	490.91	-111.85	485.05	-105.99	478.41	-99.35	472.08	-93.02
	57	440.69	413.38	27.31	457.82	-17.13	458.14	-17.45	446.17	-5.48	432.05	8.64	418.80	21.89	406.97	33.72
	58	387.22	416.11	-28.89	454.40	-67.18	452.90	-65.68	443.98	-56.76	436.37	-49.15	431.93	-44.71	430.57	-43.35
	59	351.42	413.22	-61.80	440.96	-89.54	433.20	-81.78	421.28	-69.85	411.80	-60.38	405.11	-53.69	400.23	-48.81
	60	355.43	407.04	-51.61	423.05	-67.62	408.67	-53.23	393.33	-37.90	381.61	-26.18	372.89	-17.46	366.06	-10.63
1998	61	336.88	401.88	-65.00	409.53	-72.64	392.69	-55.81	378.17	-41.29	368.52	-31.63	362.42	-25.53	358.62	-21.74
	62	320.94	395.38	-74.44	395.00	-74.06	375.95	-55.01	361.66	-40.72	352.70	-31.76	347.10	-26.16	343.41	-22.47
	63	295.19	387.94	-92.75	380.19	-85.00	359.45	-64.26	345.37	-50.18	336.82	-41.63	331.40	-36.21	327.68	-32.49
	64	269.80	378.66	-108.86	363.19	-93.38	340.17	-70.37	325.30	-55.49	316.01	-46.20	309.67	-39.87	304.94	-35.13
	65	283.78	367.78	-84.00	344.51	-60.73	319.06	-35.28	303.10	-19.32	292.90	-9.13	285.75	-1.97	280.34	3.43
	66	297.98	359.38	-61.40	332.36	-34.38	308.48	-10.50	295.37	2.61	288.34	9.64	284.57	13.41	282.75	15.23
	67	297.53	353.24	-55.71	325.49	-27.96	305.33	-7.80	296.41	1.11	293.16	4.37	292.62	4.91	293.41	4.12
	68	269.93	347.67	-77.73	319.90	-49.96	302.99	-33.05	296.86	-26.93	295.35	-25.41	295.56	-25.63	296.29	-26.36
	69	267.74	339.89	-72.15	309.90	-42.16	293.07	-25.33	286.09	-18.35	282.64	-14.90	280.19	-12.45	277.84	-10.10
	70	250.83	332.68	-81.85	301.47	-50.64	285.47	-34.64	278.75	-27.92	275.19	-24.36	272.72	-21.89	270.77	-19.94
	71	242.72	324.49	-81.77	291.34	-48.62	275.08	-32.35	267.58	-24.86	263.01	-20.28	259.58	-16.86	256.81	-14.09
	72	229.73	316.32	-86.59	281.62	-51.89	265.37	-35.64	257.64	-27.91	252.87	-23.14	249.47	-19.74	246.95	-17.22
1999	73	227.49	307.66	-80.17	271.24	-43.75	254.68	-27.19	246.47	-18.98	241.30	-13.81	237.62	-10.13	234.90	-7.40
	74	226.48	299.64	-73.16	262.49	-36.01	246.52	-20.04	238.88	-12.40	234.39	-7.91	231.54	-5.06	229.71	-3.23
	75	226.25	292.32	-66.07	255.29	-29.04	240.51	-14.26	233.92	-7.67	230.44	-4.19	228.51	-2.25	227.45	-1.20

	76	217.08	285.72	-68.64	249.48	-32.40	236.23	-19.16	230.85	-13.78	228.34	-11.27	227.15	-10.08	226.61	-9.53
	77	223.64	278.85	-55.21	243.00	-19.36	230.49	-6.85	225.34	-1.70	222.71	0.93	221.11	2.53	219.94	3.70
	78	233.90	273.33	-39.43	239.13	-5.23	228.43	5.47	224.66	9.24	223.18	10.73	222.63	11.27	222.53	11.37
	79	229.26	269.39	-40.13	238.08	-8.82	230.07	-0.81	228.36	0.91	228.54	0.72	229.39	-0.13	230.49	-1.23
	80	222.34	265.38	-43.03	236.32	-13.98	229.83	-7.49	228.72	-6.38	228.90	-6.56	229.31	-6.97	229.63	-7.29
	81	219.68	261.07	-41.40	233.52	-13.85	227.58	-7.91	226.17	-6.49	225.62	-5.94	225.13	-5.45	224.53	-4.85
	82	237.37	256.93	-19.56	230.75	6.62	225.21	12.16	223.57	13.80	222.65	14.72	221.86	15.51	221.13	16.24
	83	220.82	254.98	-34.15	232.08	-11.25	228.86	-8.04	229.09	-8.27	230.01	-9.19	231.17	-10.34	232.50	-11.68
	84	217.37	251.56	-34.19	229.83	-12.46	226.45	-9.08	225.79	-8.41	225.42	-8.05	224.96	-7.59	224.33	-6.96
2000	85	215.77	248.14	-32.37	227.34	-11.56	223.73	-7.95	222.42	-6.65	221.39	-5.62	220.41	-4.63	219.46	-3.68
	86	217.40	244.91	-27.50	225.02	-7.62	221.34	-3.94	219.76	-2.36	218.58	-1.18	217.63	-0.22	216.88	0.53
	87	215.26	242.16	-26.90	223.50	-8.24	220.16	-4.90	218.82	-3.56	217.99	-2.74	217.49	-2.24	217.25	-1.99
	88	218.10	239.47	-21.37	221.85	-3.76	218.69	-0.59	217.39	0.70	216.63	1.47	216.15	1.94	215.85	2.24
	89	221.63	237.33	-15.70	221.10	0.53	218.51	3.12	217.67	3.95	217.36	4.27	217.32	4.31	217.42	4.20
	90	235.13	235.76	-0.63	221.21	13.92	219.45	15.68	219.26	15.88	219.49	15.64	219.90	15.23	220.37	14.77
	91	251.91	235.70	16.21	223.99	27.92	224.15	27.76	225.61	26.30	227.31	24.60	229.04	22.87	230.70	21.21
	92	245.39	237.32	8.07	229.57	15.81	232.48	12.91	236.13	9.26	239.61	5.78	242.76	2.63	245.55	-0.16
	93	239.10	238.12	0.97	232.74	6.36	236.35	2.75	239.83	-0.73	242.50	-3.40	244.34	-5.24	245.43	-6.34
	94	232.51	238.22	-5.72	234.01	-1.50	237.18	-4.67	239.54	-7.03	240.80	-8.29	241.19	-8.69	241.00	-8.49
	95	225.58	237.65	-12.07	233.71	-8.12	235.77	-10.19	236.73	-11.14	236.65	-11.07	235.98	-10.40	235.05	-9.47
	96	230.97	236.44	-5.47	232.08	-1.11	232.72	-1.75	232.27	-1.30	231.12	-0.15	229.74	1.23	228.43	2.54
2001	97	230.99	235.90	-4.91	231.86	-0.87	232.19	-1.20	231.75	-0.76	231.04	-0.05	230.48	0.51	230.21	0.78
	98	225.73	235.41	-9.68	231.69	-5.96	231.83	-6.10	231.45	-5.72	231.02	-5.29	230.79	-5.06	230.76	-5.03
	99	229.07	234.44	-5.37	230.50	-1.43	230.00	-0.93	229.16	-0.09	228.37	0.70	227.75	1.32	227.24	1.83
	100	227.60	233.90	-6.30	230.21	-2.61	229.72	-2.12	229.12	-1.52	228.72	-1.12	228.54	-0.94	228.52	-0.92
	101	239.47	233.27	6.20	229.69	9.79	229.09	10.39	228.51	10.96	228.16	11.31	227.98	11.50	227.88	11.60
	102	240.30	233.89	6.40	231.65	8.65	232.20	8.09	232.90	7.40	233.82	6.48	234.88	5.42	236.00	4.30
	103	236.65	234.53	2.12	233.38	3.28	234.63	2.02	235.86	0.80	237.06	-0.40	238.13	-1.47	239.01	-2.35
	104	231.54	234.74	-3.20	234.03	-2.49	235.24	-3.70	236.18	-4.64	236.86	-5.32	237.24	-5.70	237.36	-5.82
	105	234.29	234.42	-0.14	233.53	0.75	234.13	0.16	234.32	-0.04	234.20	0.09	233.82	0.46	233.29	1.00
	106	233.45	234.41	-0.96	233.68	-0.24	234.18	-0.73	234.31	-0.86	234.24	-0.80	234.10	-0.65	233.99	-0.54
	107	227.83	234.31	-6.49	233.64	-5.81	233.96	-6.13	233.96	-6.14	233.84	-6.02	233.71	-5.88	233.61	-5.78
	108	230.07	233.66	-3.59	232.47	-2.40	232.12	-2.04	231.51	-1.43	230.84	-0.76	230.18	-0.11	229.56	0.51

2002	109	222.21	233.31	-11.09	231.99	-9.78	231.50	-9.29	230.93	-8.72	230.45	-8.24	230.12	-7.90	229.92	-7.71
	110	223.96	232.20	-8.24	230.04	-6.08	228.72	-4.76	227.45	-3.49	226.33	-2.38	225.37	-1.42	224.52	-0.57
	111	224.82	231.37	-6.55	228.82	-4.00	227.29	-2.47	226.05	-1.23	225.14	-0.32	224.52	0.30	224.13	0.70
	112	222.44	230.72	-8.28	228.02	-5.59	226.55	-4.11	225.56	-3.12	224.98	-2.55	224.70	-2.27	224.61	-2.18
	113	224.80	229.89	-5.09	226.90	-2.11	225.31	-0.52	224.31	0.49	223.71	1.09	223.34	1.45	223.09	1.71
	114	231.20	229.38	1.82	226.48	4.72	225.16	6.04	224.50	6.70	224.25	6.95	224.21	6.99	224.28	6.92
	115	254.67	229.56	25.11	227.43	27.24	226.97	27.70	227.18	27.49	227.73	26.94	228.41	26.26	229.13	25.54
	116	257.81	232.07	25.74	232.88	24.94	235.28	22.53	238.18	19.63	241.20	16.61	244.17	13.65	247.01	10.80
	117	260.03	234.65	25.39	237.86	22.17	242.04	17.99	246.03	14.00	249.50	10.53	252.35	7.68	254.57	5.46
	118	256.55	237.19	19.37	242.30	14.25	247.44	9.11	251.63	4.92	254.77	1.78	256.96	-0.41	258.39	-1.84
	119	257.51	239.12	18.39	245.15	12.37	250.17	7.34	253.60	3.91	255.66	1.85	256.71	0.80	257.10	0.41
	120	260.25	240.96	19.29	247.62	12.63	252.37	7.88	255.16	5.09	256.59	3.67	257.19	3.06	257.39	2.86
2003	121	253.95	242.89	11.06	250.15	3.81	254.74	-0.78	257.20	-3.25	258.42	-4.47	259.03	-5.08	259.40	-5.44
	122	258.44	244.00	14.44	250.91	7.53	254.50	3.93	255.90	2.54	256.19	2.25	255.98	2.45	255.59	2.85
	123	247.82	245.44	2.38	252.41	-4.60	255.68	-7.87	256.92	-9.10	257.31	-9.50	257.46	-9.64	257.58	-9.77
	124	243.79	245.68	-1.89	251.49	-7.70	253.32	-9.53	253.28	-9.48	252.56	-8.77	251.67	-7.88	250.75	-6.95
	125	245.23	245.49	-0.26	249.95	-4.72	250.46	-5.23	249.48	-4.25	248.18	-2.95	246.94	-1.71	245.88	-0.65
	126	252.45	245.46	6.99	249.01	3.44	248.89	3.56	247.78	4.67	246.70	5.75	245.92	6.54	245.43	7.03
	127	249.11	246.16	2.95	249.70	-0.59	249.96	-0.85	249.65	-0.54	249.58	-0.47	249.84	-0.73	250.34	-1.23
	128	247.39	246.46	0.94	249.58	-2.19	249.71	-2.31	249.43	-2.04	249.34	-1.95	249.40	-2.01	249.48	-2.09
	129	249.80	246.55	3.25	249.14	0.66	249.01	0.79	248.62	1.19	248.37	1.44	248.20	1.61	248.02	1.79
	130	248.26	246.88	1.39	249.28	-1.01	249.25	-0.99	249.09	-0.83	249.09	-0.82	249.16	-0.90	249.27	-1.00
	131	264.17	247.02	17.16	249.07	15.10	248.95	15.22	248.76	15.41	248.68	15.50	248.62	15.55	248.57	15.60
	132	268.01	248.73	19.28	252.09	15.92	253.52	14.49	254.92	13.08	256.42	11.59	257.95	10.06	259.49	8.52
2004	133	270.86	250.66	20.21	255.28	15.59	257.87	13.00	260.16	10.71	262.22	8.65	263.99	6.88	265.45	5.41
	134	268.64	252.68	15.96	258.39	10.25	261.77	6.88	264.44	4.20	266.54	2.10	268.11	0.53	269.24	-0.60
	135	274.99	254.28	20.71	260.44	14.54	263.83	11.16	266.12	8.86	267.59	7.39	268.43	6.56	268.82	6.16
	136	298.09	256.35	41.75	263.35	34.74	267.18	30.92	269.67	28.42	271.29	26.80	272.36	25.73	273.14	24.96
	137	314.76	260.52	54.24	270.30	44.46	276.45	38.31	281.04	33.72	284.69	30.07	287.80	26.96	290.61	24.16
	138	350.15	265.94	84.21	279.19	70.96	287.94	62.21	294.53	55.63	299.73	50.43	303.98	46.18	307.51	42.64
	139	374.42	274.37	100.05	293.38	81.03	306.61	67.81	316.78	57.64	324.94	49.48	331.68	42.73	337.36	37.06
	140	396.78	284.37	112.41	309.59	87.19	326.95	69.83	339.83	56.95	349.68	47.10	357.32	39.46	363.30	33.48
	141	446.41	295.61	150.79	327.03	119.38	347.90	98.51	362.61	83.79	373.23	73.18	381.00	65.41	386.74	59.67

	142	447.31	310.69	136.62	350.90	96.40	377.45	69.86	396.13	51.18	409.82	37.49	420.24	27.06	428.51	18.80
	143	462.66	324.35	138.31	370.19	92.48	398.41	64.26	416.60	46.06	428.56	34.10	436.48	26.18	441.67	21.00
	144	457.85	338.18	119.67	388.68	69.17	417.68	40.17	435.03	22.83	445.61	12.24	452.19	5.66	456.36	1.49
2005	145	425.06	350.15	74.91	402.52	22.55	429.74	-4.67	444.16	-19.09	451.73	-26.67	455.59	-30.53	457.41	-32.34
	146	423.46	357.64	65.82	407.03	16.44	428.33	-4.87	436.52	-13.06	438.40	-14.94	437.27	-13.81	434.77	-11.30
	147	459.08	364.22	94.85	410.31	48.76	426.87	32.20	431.30	27.78	430.93	28.14	428.99	30.09	426.85	32.22
	148	389.63	373.71	15.92	420.07	-30.44	436.53	-46.90	442.41	-52.78	445.00	-55.37	447.04	-57.41	449.41	-59.78
	149	415.67	375.30	40.37	413.98	1.69	422.46	-6.79	421.30	-5.63	417.32	-1.65	412.59	3.07	407.56	8.11
	150	429.38	379.34	50.04	414.32	15.06	420.42	8.95	419.05	10.33	416.49	12.88	414.44	14.94	413.24	16.14
	151	393.83	384.34	9.49	417.33	-23.50	423.11	-29.28	423.18	-29.35	422.93	-29.11	423.40	-29.57	424.54	-30.71
	152	403.64	385.29	18.35	412.63	-8.99	414.33	-10.68	411.44	-7.80	408.38	-4.74	405.66	-2.01	403.04	0.60
	153	407.44	387.13	20.31	410.83	-3.39	411.12	-3.68	408.32	-0.88	406.01	1.42	404.45	2.99	403.46	3.98
	154	412.78	389.16	23.62	410.15	2.63	410.02	2.77	407.97	4.82	406.72	6.06	406.24	6.54	406.24	6.54
	155	404.29	391.52	12.77	410.68	-6.39	410.85	-6.55	409.89	-5.60	409.75	-5.46	410.17	-5.88	410.82	-6.53
	156	398.16	392.80	5.37	409.40	-11.24	408.88	-10.71	407.65	-9.49	407.02	-8.86	406.64	-8.48	406.25	-8.08
Average			273.73	15.32	280.91	8.14	283.67	5.39	285.05	4.00	285.87	3.18	286.42	2.63	286.81	2.25
dispersion			4474.24	4247.48	6426.74	2535.79	7242.14	1868.55	7663.42	1539.91	7923.47	1361.25	8108.92	1260.33	8257.50	1203.38
Stdev			66.89	65.17	80.17	50.36	85.10	43.23	87.54	39.24	89.01	36.90	90.05	35.50	90.87	34.69

Table B4: Winters' additive model

Data	Price
Length	156
NMissing	0

Smoothing Constants

Alpha (level):	0.2
Gamma (trend):	0.2
Delta (seasonal):	0.2

Accuracy Measures

MAPE:	8.69
MAD:	34.45
MSD:	4800.15

Row	Time	Price	SMOO3	Predict	RESI3
1	1	177.05	175.333	176.349	0.701
2	2	176.49	174.733	175.777	0.713
3	3	179.99	180.414	181.486	-1.496
4	4	179.27	178.561	179.574	-0.304
5	5	178.53	177.759	178.759	-0.229
6	6	179.64	182.854	183.846	-4.206
7	7	180.25	180.570	181.393	-1.143
8	8	179.56	179.422	180.199	-0.639
9	9	181.60	183.576	184.328	-2.728
10	10	183.53	181.837	182.480	1.050
11	11	188.10	181.028	181.713	6.387
12	12	194.98	186.161	187.101	7.879
13	13	211.29	187.336	188.592	22.698
14	14	211.75	192.323	194.487	17.263
15	15	246.77	201.348	204.202	42.568
16	16	235.63	213.747	218.303	17.327
17	17	230.28	220.091	225.341	4.939
18	18	227.72	233.786	239.233	-11.513
19	19	224.17	233.923	238.910	-14.740
20	20	227.18	232.302	236.699	-9.519
21	21	229.99	239.621	243.637	-13.647
22	22	254.78	237.384	240.854	13.926
23	23	271.25	240.815	244.842	26.408
24	24	272.35	254.289	259.373	12.977
25	25	270.38	262.856	268.459	1.921
26	26	270.59	268.016	273.695	-3.105
27	27	278.10	275.090	280.646	-2.546
28	28	277.15	279.255	284.709	-7.559
29	29	271.57	281.566	286.717	-15.147
30	30	292.50	285.793	290.339	2.161
31	31	302.04	289.088	293.719	8.321
32	32	312.88	292.538	297.503	15.377

33	33	339.99	305.453	311.033	28.957
34	34	370.93	316.126	322.864	48.066
35	35	357.91	330.761	339.422	18.488
36	36	360.29	350.167	359.567	0.723
37	37	351.45	362.071	371.500	-20.050
38	38	366.99	361.041	369.669	-2.679
39	39	402.65	373.338	381.858	20.792
40	40	419.99	385.052	394.404	25.586
41	41	434.67	395.852	406.227	28.443
42	42	471.55	419.876	431.389	40.161
43	43	513.83	439.224	452.343	61.487
44	44	546.08	461.428	477.007	69.073
45	45	680.07	500.657	518.999	161.071
46	46	1015.35	554.428	579.212	436.138
47	47	864.94	664.441	706.671	158.269
48	48	751.68	762.880	811.441	-59.761
49	49	662.21	846.714	892.885	-230.675
50	50	649.85	800.292	837.236	-187.386
51	51	520.01	789.429	818.877	-298.867
52	52	463.50	778.983	796.476	-332.976
53	53	544.61	690.349	694.524	-149.914
54	54	503.97	636.374	634.552	-130.582
55	55	455.29	622.857	615.812	-160.522
56	56	379.06	573.466	560.000	-180.940
57	57	440.69	498.738	478.034	-37.344
58	58	387.22	480.197	457.999	-70.779
59	59	351.42	430.335	405.306	-53.886
60	60	355.43	392.431	365.246	-9.816
61	61	336.88	367.565	339.988	-3.108
62	62	320.94	328.561	300.859	20.081
63	63	295.19	309.828	282.930	12.260
64	64	269.80	290.737	264.330	5.470
65	65	283.78	258.329	232.140	51.640
66	66	297.98	246.169	222.046	75.934
67	67	297.53	241.502	220.416	77.114
68	68	269.93	236.131	218.129	51.801
69	69	267.74	236.078	220.149	47.591
70	70	250.83	234.125	220.099	30.731
71	71	242.72	222.487	209.690	33.030
72	72	229.73	223.211	211.736	17.994
73	73	227.49	217.095	206.340	21.150
74	74	226.48	207.179	197.270	29.210
75	75	226.25	207.621	198.880	27.370
76	76	217.08	206.619	198.973	18.107
77	77	223.64	200.493	193.571	30.069
78	78	233.90	203.800	198.081	35.819
79	79	229.26	206.028	201.741	27.519
80	80	222.34	207.058	203.872	18.468
81	81	219.68	212.701	210.254	9.426
82	82	237.37	211.594	209.524	27.846

83	83	220.82	213.458	212.502	8.318
84	84	217.37	217.854	217.230	0.140
85	85	215.77	219.661	219.043	-3.273
86	86	217.40	213.629	212.880	4.520
87	87	215.26	216.164	215.596	-0.336
88	88	218.10	217.385	216.803	1.297
89	89	221.63	213.550	213.020	8.610
90	90	235.13	216.345	216.160	18.970
91	91	251.91	222.071	222.645	29.265
92	92	245.39	226.155	227.900	17.490
93	93	239.10	234.658	237.102	1.998
94	94	232.51	241.266	243.790	-11.280
95	95	225.58	237.307	239.380	-13.800
96	96	230.97	237.402	238.922	-7.952
97	97	230.99	238.972	240.174	-9.184
98	98	225.73	233.708	234.543	-8.813
99	99	229.07	234.498	234.980	-5.910
100	100	227.60	235.241	235.487	-7.887
101	101	239.47	229.340	229.270	10.200
102	102	240.30	233.492	233.831	6.469
103	103	236.65	236.251	236.849	-0.199
104	104	231.54	235.132	235.722	-4.182
105	105	234.29	236.470	236.893	-2.603
106	106	233.45	236.432	236.750	-3.300
107	107	227.83	233.776	233.962	-6.132
108	108	230.07	234.574	234.514	-4.444
109	109	222.21	233.574	233.337	-11.127
110	110	223.96	228.344	227.662	-3.702
111	111	224.82	229.030	228.200	-3.380
112	112	222.44	226.403	225.437	-2.997
113	113	224.80	223.259	222.174	2.626
114	114	231.20	224.858	223.878	7.322
115	115	254.67	224.283	223.595	31.075
116	116	257.81	229.131	229.687	28.123
117	117	260.03	238.222	239.903	20.127
118	118	256.55	246.669	249.155	7.395
119	119	257.51	249.482	252.264	5.246
120	120	260.25	254.944	257.936	2.314
121	121	253.95	259.102	262.186	-8.236
122	122	258.44	259.043	261.798	-3.358
123	123	247.82	262.289	264.909	-17.089
124	124	243.79	260.506	262.443	-18.653
125	125	245.23	257.998	259.188	-13.958
126	126	252.45	255.362	255.994	-3.544
127	127	249.11	254.050	254.541	-5.431
128	128	247.39	253.491	253.764	-6.374
129	129	249.80	253.121	253.139	-3.339
130	130	248.26	250.935	250.819	-2.559
131	131	264.17	250.193	249.975	14.195
132	132	268.01	253.931	254.281	13.729

133	133	270.86	255.615	256.514	14.346
134	134	268.64	261.950	263.423	5.217
135	135	274.99	265.509	267.190	7.800
136	136	298.09	267.437	269.431	28.659
137	137	314.76	276.268	279.408	35.352
138	138	350.15	287.934	292.489	57.661
139	139	374.42	306.045	312.906	61.514
140	140	396.78	327.385	336.706	60.074
141	141	446.41	353.746	365.470	80.940
142	142	447.31	384.299	399.261	48.049
143	143	462.66	410.816	427.700	34.960
144	144	457.85	443.056	461.338	-3.488
145	145	425.06	458.019	476.161	-51.101
146	146	423.46	465.793	481.891	-58.431
147	147	459.08	472.417	486.178	-27.098
148	148	389.63	470.519	483.196	-93.566
149	149	415.67	463.162	472.096	-56.426
150	150	429.38	468.037	474.714	-45.334
151	151	393.83	444.773	449.637	-55.807
152	152	403.64	443.097	445.729	-42.089
153	153	407.44	446.311	447.260	-39.820
154	154	412.78	416.745	416.101	-3.321
155	155	404.29	422.253	421.476	-17.186
156	156	398.16	427.402	425.937	-27.777

Row	Period	Forecast	Lower	Upper
1	157	401.095	316.684	485.507
2	158	403.118	316.947	489.288
3	159	408.210	320.146	496.275
4	160	393.369	303.283	483.454
5	161	395.391	303.166	487.615
6	162	400.483	306.009	494.958
7	163	385.642	288.815	482.469
8	164	387.664	288.389	486.938
9	165	392.756	290.945	494.568
10	166	377.915	273.485	482.344
11	167	79.937	272.812	487.061
12	168	385.029	275.140	494.919
13	169	370.188	257.468	482.907
14	170	372.210	256.600	487.820
15	171	377.303	258.746	495.859
16	172	362.461	240.905	484.016
17	173	364.483	239.880	489.085
18	174	369.576	241.881	497.270
19	175	354.734	223.906	485.561
20	176	356.756	222.756	490.755

Table- B5:

ARMA (0,2) Model: PRICE

ARMA model for PRICE

Final Estimates of Parameters

Type	Coef	SE Coef	T	P
MA 1	-1.2445	0.0574	-21.67	0.000
MA 2	-0.7569	0.0561	-13.49	0.000
Constant	307.73	13.24	23.24	0.000
Mean	307.73	13.24		

Number of observations: 156

Residuals: SS = 476437 (backforecasts excluded)
MS = 3114 DF = 153

Modified Box-Pierce (Ljung-Box) Chi-Square statistic

Lag	12	24	36	48
Chi-Square	285.3	299.6	380.1	499.5
DF	9	21	33	45
P-Value	0.000	0.000	0.000	0.000

Forecasts from period 156

Period	Forecast	95 Percent Limits Lower	Upper
157	332.133	222.737	441.529
158	301.249	126.601	475.897
159	307.727	114.445	501.009
160	307.727	114.445	501.009
161	307.727	114.445	501.009
162	307.727	114.445	501.009
163	307.727	114.445	501.009
164	307.727	114.445	501.009
165	307.727	114.445	501.009
166	307.727	114.445	501.009
167	307.727	114.445	501.009
168	307.727	114.445	501.009

Table - B6

ARIMA (1,1) Results:

Type	Coef	SE Coef	T	P
AR 1	-0.2154	0.4695	-0.46	0.647
MA 1	-0.3705	0.4465	-0.83	0.408
Constant	1.728	4.425	0.39	0.697

Forecasts from period 156

		95 Percent Limits	
Period	Forecast	Lower	Upper
157	399.106	320.300	477.912
158	400.630	280.229	521.031
159	402.029	252.663	551.395
160	403.456	229.603	577.308
161	404.876	209.640	600.112
162	406.298	191.788	620.808
163	407.719	175.533	639.906
164	409.141	160.530	657.752
165	410.563	146.548	674.577
166	411.984	133.416	690.552
167	413.406	121.008	705.804
168	414.827	109.224	720.430

Table B7: Country wise price index and volatility estimation

		Bangladesh (DSE)			CHINA			INDIA			INDONESIA			JORDAN			KOREA			MALAYSIA		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
1993	Jan	9.43			98.88			97.95			327.54			93.51			114.08			197.92		
	Feb	9.46			108.82			100.35			353.81			92.20			106.22			207.65		
	Mar	9.96			97.13			84.80			357.56			94.24			112.50			214.06		
	Apr	9.68	0.06		91.77	50.69		79.30	103.46		367.92	295.29		94.68	1.18		122.78	46.58		249.12	497.19	
	May	9.63	0.04		86.28	92.64		83.39	85.11		409.12	644.62		102.72	21.46		128.55	100.69		257.85	625.28	
	Jun	10.70	0.24		82.25	42.05		84.39	6.33		432.19	1224.44		114.44	89.37		125.33	48.17		247.68	371.62	
	Jul	10.69	0.36	0.18	72.52	65.94	62.83	89.52	17.66	53.14	424.66	823.04	746.85	110.33	76.02	47.01	120.97	10.83	51.57	259.95	37.83	382.98
	Aug	10.48	0.25	0.22	84.82	38.32	59.74	101.24	67.07	44.04	520.77	2531.75	1305.96	100.63	41.80	57.16	112.85	46.26	51.49	284.94	250.36	321.27
	Sep	10.65	0.01	0.22	90.51	56.36	50.67	105.08	94.37	46.36	503.47	2394.34	1743.39	104.48	37.51	61.18	120.73	27.02	33.07	306.13	680.11	334.98
	Oct	11.39	0.16	0.20	99.26	125.59	71.55	103.25	49.17	57.07	524.11	2172.76	1980.47	101.70	18.88	43.55	123.14	20.39	26.12	354.93	1625.43	648.43
	Nov	9.50	0.61	0.26	107.44	98.58	79.71	125.41	125.94	84.14	568.31	762.83	1965.42	94.94	16.06	28.56	134.67	81.43	43.77	348.58	1135.13	922.76
	Dec	10.01	0.67	0.36	133.55	345.09	156.41	133.04	219.67	122.29	647.58	4073.29	2350.80	100.34	16.04	22.12	149.24	169.92	74.69	421.02	2253.26	1423.48
1994	Jan	14.01	4.07	1.38	115.80	215.30	196.14	154.99	455.86	212.66	666.14	4464.13	2868.25	106.40	22.24	18.31	169.29	396.42	167.04	355.24	1169.04	1545.71
	Feb	13.65	5.60	2.74	109.57	140.47	199.86	165.75	352.19	288.42	606.56	1907.79	2802.01	108.72	38.57	23.23	167.19	266.45	228.56	369.36	1076.61	1408.51
	Mar	18.87	13.22	5.89	89.57	329.27	257.53	147.28	189.15	304.22	547.45	2765.15	3302.59	105.56	12.53	22.35	152.50	103.09	233.97	314.81	1924.03	1605.73
	Apr	17.32	6.48	7.34	87.47	201.81	221.71	143.89	94.04	272.81	492.61	5602.63	3684.93	99.43	15.73	22.27	162.78	55.80	205.44	346.58	534.45	1176.03
	May	16.12	4.84	7.53	91.30	103.64	193.80	145.66	103.29	184.67	553.29	2169.95	3111.38	97.18	28.52	23.84	169.94	58.65	121.00	334.94	519.13	1013.56
	Jun	16.50	1.48	6.50	80.91	20.68	163.85	152.93	15.32	100.45	505.18	915.14	2863.22	97.93	14.47	17.81	167.06	58.31	68.96	340.40	189.43	791.76
	Jul	16.97	0.28	3.27	90.36	22.01	87.04	157.46	40.17	63.20	492.15	838.58	2381.58	98.87	0.99	14.93	167.32	8.79	45.39	349.16	40.77	320.95
	Aug	18.12	0.75	1.84	95.56	38.14	46.12	170.13	105.66	66.11	563.15	1226.79	1287.62	93.81	4.86	12.21	175.54	15.51	35.31	388.15	578.30	331.91
	Sep	18.37	0.81	0.83	96.53	51.15	32.99	160.64	53.03	53.55	539.93	1050.06	1007.64	92.91	8.75	7.27	202.41	278.56	90.29	386.13	611.44	354.99
	Oct	20.09	1.66	0.88	92.66	7.90	29.80	158.19	34.13	58.25	555.72	1017.43	1033.21	91.96	9.50	6.02	203.50	342.73	161.40	383.10	339.71	392.56
	Nov	22.31	3.75	1.74	80.57	54.18	37.84	152.89	51.99	61.20	494.29	953.54	1061.95	92.51	0.61	5.93	194.47	167.32	201.03	350.48	316.09	461.39
	Dec	21.14	2.80	2.25	70.58	139.70	63.23	145.14	47.08	46.56	472.82	1495.36	1129.10	91.21	0.54	4.85	182.26	96.00	221.15	333.77	649.97	479.30
1995	Jan	20.76	0.87	2.27	60.83	185.90	96.92	136.15	92.11	56.33	432.50	2644.30	1527.66	91.90	0.28	2.73	165.55	269.82	218.97	299.81	1203.04	627.20
	Feb	20.47	0.65	2.02	67.80	66.98	111.69	128.94	109.05	75.06	468.64	657.03	1437.56	91.35	0.35	0.45	162.02	228.41	190.39	340.31	482.22	662.83
	Mar	19.52	0.48	1.20	67.91	17.41	102.50	124.06	84.08	83.08	443.17	382.45	1294.78	91.35	0.09	0.32	175.54	85.78	170.00	341.03	382.41	679.41
	Apr	19.05	0.64	0.66	60.64	16.92	71.80	117.79	60.21	86.36	423.35	383.02	1016.70	99.92	17.66	4.60	175.77	49.10	158.27	336.70	394.41	615.52
	May	17.49	1.55	0.83	70.33	17.52	29.70	122.45	21.17	68.63	490.77	866.24	572.19	107.91	63.29	20.35	173.48	42.77	101.51	374.27	308.45	391.87
	Jun	19.33	0.86	0.88	69.36	19.30	17.78	118.06	9.91	43.84	510.54	1644.91	819.16	100.81	46.04	31.77	176.32	1.54	44.80	367.79	355.00	360.07
	Jul	19.41	0.81	0.97	72.82	28.10	20.46	122.62	7.09	24.59	521.00	1925.00	1204.79	97.58	19.79	36.70	183.21	17.60	27.75	375.60	333.01	347.72
	Aug	19.36	0.88	1.03	68.58	3.39	17.08	117.96	6.82	11.25	494.89	196.49	1158.16	94.60	32.69	40.45	176.86	16.86	19.69	353.99	97.75	273.55
	Sep	20.82	0.53	0.77	65.45	9.15	14.98	114.23	11.79	8.90	481.06	307.67	1018.52	93.60	10.58	27.28	193.53	64.04	25.01	347.14	166.82	238.14
	Oct	22.09	1.70	0.98	61.38	23.46	16.03	111.20	24.29	12.50	487.42	307.69	684.21	92.25	5.14	17.05	196.83	84.96	45.86	327.83	388.56	246.54
	Nov	21.00	1.26	1.09	57.00	25.25	15.31	94.98	102.54	36.36	464.86	163.36	243.80	88.37	7.46	13.97	181.21	91.85	64.43	328.25	176.98	207.53
	Dec	20.76	0.39	0.97	54.36	23.88	20.43	98.83	87.28	56.48	508.22	321.86	275.15	96.14	10.52	8.43	173.81	115.01	88.96	346.97	120.53	213.22
1996	Jan	19.01	1.62	1.24	62.68	14.87	21.87	89.33	85.91	75.00	575.19	2265.39	764.58	93.35	10.36	8.37	169.71	142.81	108.66	359.36	236.05	230.53
	Feb	19.43	0.96	1.06	64.54	22.68	21.67	108.99	68.55	86.07	584.91	3243.69	1498.57	92.17	10.38	9.68	166.10	42.06	97.93	372.66	356.75	222.58
	Mar	19.73	0.56	0.88	61.57	19.85	20.32	110.09	94.87	84.15	575.71	1258.27	1772.30	88.93	8.91	10.04	169.67	9.95	77.46	396.40	447.53	290.22
	Apr	20.46	0.38	0.88	58.31	6.83	16.06	123.69	199.99	112.33	622.92	511.00	1819.59	90.37	3.80	8.37	189.44	112.60	76.85	417.14	654.91	423.81

		BD (DSE)			CHINA			INDIA			INDONESIA			JORDAN			KOREA			MALAYSIA		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
	Jul	28.34	12.62	4.08	58.90	2.05	4.43	112.49	26.46	79.04	522.08	1931.61	822.38	78.47	32.12	15.52	142.56	450.32	243.63	376.63	278.61	338.32
	Aug	29.85	16.41	8.08	58.71	1.69	3.15	110.10	35.29	37.86	539.84	1549.56	1082.02	81.29	13.83	18.03	135.01	182.91	261.21	396.91	133.36	207.93
	Sep	41.43	57.71	22.35	58.03	2.12	2.02	101.09	81.46	45.61	575.51	987.33	1218.52	83.18	4.02	17.82	133.36	46.01	242.00	403.22	149.69	161.51
	Oct	73.19	433.98	130.18	56.48	1.20	1.76	98.87	44.44	46.91	571.32	656.29	1281.20	81.60	3.85	13.46	124.98	52.00	182.81	411.17	218.15	194.95
	Nov	75.12	517.59	256.42	63.00	7.80	3.20	90.07	67.67	57.22	621.77	1139.64	1083.20	80.98	0.96	5.67	122.68	37.08	79.50	427.94	180.16	170.34
	Dec	56.38	250.48	314.94	73.44	58.67	17.45	95.11	23.25	54.20	637.23	1091.18	968.61	85.19	3.54	3.09	107.10	120.15	63.81	432.06	186.68	183.67
1997	Jan	45.97	194.82	349.22	71.81	62.87	32.64	103.67	33.18	42.13	675.90	1874.06	1190.29	84.30	4.18	3.13	112.75	70.66	69.97	438.13	133.45	179.61
	Feb	39.87	238.51	300.35	73.92	26.10	38.86	110.79	84.12	52.06	683.74	894.21	1249.77	86.23	5.17	3.46	107.33	53.20	70.27	457.17	167.13	166.85
	Mar	28.07	139.85	205.91	71.79	1.22	37.22	101.83	41.58	45.53	633.24	675.45	1133.73	84.61	0.72	3.40	103.60	14.27	64.57	431.43	144.85	158.03
	Apr	22.42	115.58	172.19	81.27	20.20	27.60	114.72	36.49	48.84	614.44	1113.62	1139.33	84.15	0.92	2.75	107.20	14.23	38.09	382.77	1003.35	362.19
	May	28.49	53.50	136.86	79.48	20.13	16.91	112.89	32.63	48.71	656.38	895.76	894.76	92.32	14.21	5.26	115.57	25.69	26.85	389.86	1239.80	638.78
	Jun	26.03	7.68	79.15	81.02	19.99	15.39	129.74	131.66	60.59	671.76	637.71	830.64	93.34	23.99	9.96	117.49	44.08	24.57	379.13	584.27	743.07
	Jul	25.72	6.22	45.74	91.99	33.13	23.36	131.35	94.42	73.80	603.92	1062.05	927.29	92.32	18.34	14.37	113.19	19.99	26.00	341.89	461.55	822.24
	Aug	22.79	5.46	18.21	97.40	74.87	37.03	117.04	84.22	85.73	357.35	21388.43	5995.99	90.67	1.21	14.44	109.51	11.84	25.40	238.25	4781.21	1766.71
	Sep	19.29	9.85	7.30	81.20	66.41	48.60	118.92	53.65	90.99	383.53	24714.88	11950.77	90.53	1.83	11.34	98.67	64.88	35.20	220.46	6017.47	2961.13
	Oct	22.01	6.99	7.13	68.02	168.36	85.69	114.84	54.74	71.76	326.63	15927.10	15773.11	84.53	11.69	8.27	67.83	423.95	130.16	173.96	5024.67	4071.23
	Nov	19.66	2.97	6.32	55.70	320.02	157.41	102.44	55.27	61.97	248.59	3416.33	16361.68	83.66	14.23	7.24	50.85	734.98	308.91	136.82	2106.37	4482.43
	Dec	17.56	3.36	5.79	54.05	159.21	178.50	104.23	64.44	57.02	162.19	9253.16	13327.87	83.67	10.97	9.68	35.08	740.88	491.17	135.63	1600.32	3687.21
1998	Jan	16.67	5.67	4.75	40.30	128.61	194.05	93.39	77.37	62.96	106.31	9375.81	9493.10	82.95	0.42	9.33	59.84	197.28	524.27	120.33	519.29	2312.66
	Feb	16.34	2.23	3.56	54.61	52.91	165.19	103.23	25.06	55.53	122.18	4055.48	6525.20	79.63	3.72	7.34	56.15	119.05	448.05	180.44	669.13	1223.78
	Mar	15.14	1.00	3.07	53.09	46.71	96.86	110.50	49.97	54.21	143.96	600.08	5821.13	78.91	5.62	5.18	55.53	125.69	295.72	175.64	878.11	916.71
	Apr	14.20	1.28	2.55	47.56	41.93	67.54	112.79	76.25	57.16	126.00	239.17	3567.63	78.76	3.86	3.41	53.72	6.59	112.15	147.95	773.33	709.97
	May	12.65	2.43	1.74	40.95	38.32	44.97	99.36	39.06	47.58	82.53	670.70	1391.36	77.43	0.84	3.51	40.35	55.75	76.77	121.60	743.60	766.04
	Jun	13.61	1.09	1.45	34.39	65.67	48.16	86.41	146.10	77.85	68.06	1276.25	696.55	71.14	13.50	5.96	36.50	90.56	69.64	93.86	1230.41	906.36
	Jul	14.90	0.91	1.43	28.17	69.91	53.96	85.28	166.73	107.04	86.30	614.99	700.28	70.72	17.43	8.91	47.75	58.97	52.97	83.72	837.59	896.23
	Aug	14.37	0.95	1.34	20.37	77.17	62.77	78.03	78.80	107.67	65.95	104.16	666.52	70.32	11.35	10.78	39.86	22.53	56.95	60.31	644.69	864.07
	Sep	12.84	0.81	0.94	29.17	33.46	61.55	81.84	14.28	101.48	48.70	236.43	557.96	67.05	3.48	11.44	38.86	23.84	48.97	56.18	331.06	760.94
	Oct	13.23	0.92	0.90	32.07	24.97	51.38	75.57	18.23	69.51	75.77	255.45	302.76	63.16	12.33	11.15	51.20	36.27	35.40	61.88	152.98	491.58
	Nov	13.09	0.46	0.79	33.09	33.40	42.25	74.20	11.25	30.64	116.64	831.88	356.98	66.44	8.61	8.94	60.79	107.75	47.60	77.86	90.50	304.81
	Dec	12.57	0.08	0.57	30.36	3.05	23.72	80.37	13.58	14.33	109.65	994.15	579.48	71.74	12.50	9.23	83.32	353.37	130.31	91.78	259.49	208.51
1999	Jan	11.25	0.81	0.57	24.72	13.95	18.84	89.96	50.91	23.49	106.21	326.13	601.90	76.25	33.35	16.70	86.11	291.51	197.22	93.19	213.35	179.08
	Feb	11.18	0.91	0.57	23.67	20.33	17.68	86.95	49.47	31.30	101.79	39.27	547.86	80.27	35.42	22.47	76.39	128.50	220.28	102.59	103.91	166.81
	Mar	11.19	0.46	0.57	26.70	8.69	11.51	101.44	77.48	47.86	104.36	10.92	342.62	79.43	14.95	24.05	89.16	29.72	200.78	94.90	23.23	150.00
	Apr	10.77	0.05	0.56	33.37	18.99	15.49	88.67	43.18	55.26	145.69	435.32	202.91	73.72	9.08	23.20	112.85	239.39	172.28	131.80	321.39	165.47
	May	10.01	0.31	0.43	32.94	22.74	17.69	105.23	83.21	63.34	175.75	1259.18	436.17	72.03	16.81	19.06	113.08	330.92	182.13	146.91	597.67	261.55
	Jun	10.60	0.24	0.26	48.26	83.68	33.52	108.89	77.44	70.33	230.19	2803.97	1127.35	71.39	13.38	13.55	146.60	557.82	289.46	162.32	834.07	444.09
	Jul	11.39	0.32	0.23	42.23	54.78	45.04	120.68	174.87	94.68	198.41	1276.03	1443.62	71.66	1.10	10.09	152.46	451.41	394.88	154.67	169.85	480.75
	Aug	11.13	0.37	0.31	41.86	39.82	50.25	131.48	142.27	119.45	168.59	768.76	1526.98	69.59	1.18	8.12	155.36	381.86	430.50	180.44	206.04	451.91
	Sep	10.68	0.14	0.27	40.12	12.58	47.71	131.40	115.64	127.56	149.05	1258.28	1526.76	67.58	3.56	4.80	132.43	103.96	373.76	156.73	137.38	336.83
	Oct	10.47	0.18	0.25	36.80	6.15	28.33	122.10	34.02	116.70	200.30	612.00	978.77	67.32	4.08	2.48	134.05	144.28	270.38	177.11	180.06	173.33
	Nov	11.12	0.11	0.20	36.10	7.46	16.50	129.72	19.88	77.95	175.58	448.15	771.80	68.75	1.11	2.48	163.30	237.91	217.00	175.02	113.09	159.14
	Dec	10.25	0.14	0.14	33.38	7.70	8.47	148.42	123.28	73.20	210.57	754.74	768.30	73.18	7.38	4.03	158.45	259.00	186.29	194.21	235.03	166.39

		BD (DSE)			CHINA			INDIA			INDONESIA			JORDAN			KOREA			MALAYSIA		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
2000	Jan	9.70	0.35	0.19	31.92	5.24	6.64	164.38	362.00	134.79	184.38	246.41	515.33	69.98	6.22	4.70	160.15	180.77	205.49	222.97	491.25	254.86
	Feb	9.63	0.47	0.27	26.06	17.96	9.59	194.48	752.31	314.36	167.25	352.25	450.39	66.11	8.59	5.82	137.11	142.42	205.03	239.31	827.36	416.68
	Mar	9.81	0.08	0.26	26.59	13.74	11.16	174.52	372.13	402.43	165.73	434.71	447.03	67.18	9.99	8.05	152.93	110.19	173.10	237.09	430.89	496.13
	Apr	10.29	0.09	0.25	28.93	7.14	11.02	146.51	401.13	471.89	143.81	276.74	327.53	65.72	3.70	7.13	135.36	146.67	145.01	218.54	105.50	463.75
	May	10.33	0.12	0.19	29.16	2.52	10.34	128.99	846.13	592.93	105.70	823.17	471.72	61.70	5.76	7.01	133.27	80.60	119.97	225.10	97.40	365.29
	Jun	10.59	0.11	0.10	33.00	7.04	7.61	141.96	367.77	496.79	117.98	719.58	563.55	59.93	11.48	7.73	151.76	109.26	111.68	201.37	222.06	213.96
	Jul	11.15	0.16	0.12	32.37	4.48	5.30	126.39	95.78	427.70	110.20	290.01	527.38	57.12	12.97	8.48	127.34	109.19	111.43	191.66	236.41	165.34
	Aug	12.71	1.14	0.38	31.05	2.87	4.23	131.97	46.42	339.03	111.40	25.75	464.63	55.00	8.80	9.75	123.28	158.38	114.36	189.80	263.35	204.81
	Sep	13.14	1.48	0.72	27.18	6.80	5.30	117.55	104.59	153.64	96.01	85.56	280.23	55.60	4.84	9.52	107.94	329.68	176.63	166.88	213.35	233.79
	Oct	12.39	0.73	0.88	25.90	9.47	5.90	107.37	115.67	90.62	84.26	165.57	141.72	56.62	0.92	6.88	87.53	325.73	230.74	177.66	133.51	211.65
	Nov	12.81	0.10	0.86	22.45	12.61	7.94	115.15	105.53	93.05	86.19	153.87	107.69	56.39	0.55	3.78	81.79	364.01	294.45	173.09	93.93	176.03
	Dec	12.44	0.12	0.61	22.63	5.61	8.62	114.55	19.24	86.26	77.83	56.63	115.41	55.14	0.48	1.70	78.67	173.13	298.14	160.71	54.53	123.83
2001	Jan	11.92	0.13	0.27	25.92	3.78	7.87	124.61	50.06	72.62	85.85	15.16	97.81	57.01	0.66	0.65	100.28	91.03	238.47	173.29	53.24	83.80
	Feb	11.75	0.23	0.15	23.55	2.54	6.14	120.08	22.24	49.27	84.85	15.54	60.30	57.68	1.17	0.72	92.85	99.75	181.98	169.23	34.64	59.09
	Mar	11.61	0.13	0.15	19.72	6.56	4.62	98.78	126.88	54.60	69.02	60.54	36.97	58.07	1.69	1.00	79.22	112.71	119.15	154.14	73.74	54.04
	Apr	11.91	0.02	0.13	21.70	6.98	4.96	96.53	207.53	101.68	57.79	181.73	68.24	56.74	0.37	0.97	90.30	76.12	94.90	138.06	256.77	104.60
	May	13.09	0.46	0.21	22.12	2.50	4.64	100.06	119.03	118.92	71.05	123.30	95.28	58.95	0.84	1.02	97.14	58.47	86.76	134.53	254.88	155.01
	Jun	13.29	0.70	0.33	22.83	1.78	4.45	94.55	5.95	114.85	74.47	52.11	104.42	59.36	1.34	1.06	91.66	56.47	75.94	139.37	74.87	165.07
	Jul	12.29	0.42	0.40	19.74	1.75	3.25	90.98	14.39	86.73	89.78	172.90	132.51	61.51	3.82	1.59	85.04	24.72	53.94	157.08	101.79	172.08
	Aug	11.76	0.50	0.52	15.46	11.06	4.27	89.28	22.70	40.52	93.94	126.51	118.71	64.22	5.83	2.96	87.84	27.44	41.77	164.81	205.80	159.33
	Sep	12.28	0.41	0.51	14.84	14.21	7.20	76.74	60.04	25.77	75.55	97.80	112.33	64.11	5.41	4.10	73.57	60.74	42.34	147.07	124.58	126.76
	Oct	12.02	0.06	0.35	15.21	5.29	8.08	81.83	44.01	35.28	67.85	148.27	136.37	69.60	11.55	6.65	85.10	40.32	38.30	142.77	98.62	132.70
	Nov	15.13	2.46	0.86	16.69	0.64	7.80	90.17	40.78	41.88	65.29	167.59	135.04	72.36	16.73	9.88	106.65	188.08	79.14	151.40	90.98	129.99
	Dec	15.39	3.25	1.55	16.74	0.98	5.28	90.29	44.26	47.27	69.36	19.01	108.17	71.14	13.23	11.73	114.84	362.24	162.84	164.33	86.79	100.24
2002	Jan	13.05	2.66	2.11	15.16	0.78	1.92	91.85	20.56	37.40	84.71	76.89	102.94	73.45	2.73	11.06	123.48	270.55	215.29	172.97	179.81	114.05
	Feb	13.38	1.42	2.45	15.29	0.74	0.78	97.44	11.71	29.33	85.71	109.59	93.27	73.37	1.17	8.47	135.69	154.29	243.79	170.06	91.35	112.23
	Mar	13.85	1.07	2.10	16.13	0.55	0.76	96.48	12.13	22.17	96.14	121.70	81.80	74.61	2.11	4.81	147.47	203.14	247.55	183.84	67.06	106.25
	Apr	13.30	0.11	1.32	16.76	0.56	0.66	92.45	7.94	13.09	114.02	184.98	123.29	70.13	3.70	2.43	147.46	131.43	189.85	193.61	116.08	113.57
	May	13.12	0.10	0.68	16.89	0.54	0.60	86.50	24.72	14.13	122.12	274.67	172.74	74.64	4.50	2.87	147.81	35.40	131.07	180.08	94.82	92.33
	Jun	13.81	0.13	0.35	16.31	0.13	0.45	89.00	18.77	15.89	114.45	121.25	175.65	80.30	17.34	6.91	142.10	7.55	94.38	177.39	50.40	82.09
	Jul	15.24	0.92	0.32	15.55	0.37	0.40	82.08	19.05	17.62	103.32	59.74	160.16	77.48	18.81	11.09	138.26	21.03	48.85	176.64	62.85	81.04
	Aug	15.16	1.09	0.56	15.25	0.55	0.40	86.91	8.47	17.75	99.79	105.19	140.21	74.97	6.90	11.89	138.83	19.21	20.80	174.72	4.93	53.25
	Sep	15.23	0.49	0.66	13.95	0.97	0.50	82.60	11.28	14.39	93.32	78.31	91.12	73.22	9.48	13.13	119.14	108.85	39.16	156.63	97.48	53.92
	Oct	14.68	0.07	0.64	14.01	0.69	0.64	82.24	5.34	11.03	76.93	136.85	95.02	70.98	7.55	10.69	125.24	95.43	61.13	162.99	91.27	64.13
	Nov	14.72	0.08	0.43	14.59	0.37	0.65	90.78	16.28	10.34	86.08	96.47	104.21	72.27	2.83	6.69	141.22	113.20	84.17	156.07	75.13	67.20
	Dec	14.78	0.07	0.18	14.03	0.09	0.53	95.65	42.80	18.93	95.79	71.74	95.84	72.94	1.00	5.22	123.37	93.34	102.70	159.97	10.35	68.56
2003	Jan	13.95	0.15	0.09	14.71	0.13	0.32	91.69	31.84	24.07	83.86	60.76	91.45	75.26	3.22	3.65	118.00	99.79	100.44	166.16	18.54	48.82
	Feb	13.94	0.22	0.13	14.38	0.09	0.17	92.98	4.48	23.85	87.07	27.41	64.09	71.62	2.51	2.39	110.56	170.47	119.20	161.43	17.38	30.35
	Mar	12.97	0.55	0.25	13.82	0.15	0.11	86.04	16.40	23.88	88.03	25.61	46.38	74.93	2.94	2.42	99.81	104.16	116.94	157.75	12.67	14.73
	Apr	13.61	0.21	0.28	13.63	0.25	0.15	82.07	25.74	19.62	105.40	94.22	52.00	79.36	10.03	4.68	113.99	60.89	108.83	155.99	20.21	17.20
	May	13.67	0.17	0.29	15.25	0.53	0.25	88.45	20.82	16.86	123.50	296.03	110.82	82.71	23.77	9.82	120.93	77.51	103.26	166.34	20.91	17.79
	Jun	14.34	0.32	0.31	16.19	1.48	0.60	100.79	65.20	32.04	126.69	320.52	184.10	86.70	25.01	15.44	130.49	166.65	102.30	172.30	58.09	27.97

		BD (DSE)			CHINA			INDIA			INDONESIA			JORDAN			KOREA			MALAYSIA		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
	Jul	13.82	0.11	0.20	17.77	3.01	1.32	106.96	128.61	60.09	118.97	87.95	199.68	92.96	34.17	23.25	144.59	175.58	120.16	179.87	101.60	50.20
	Aug	13.70	0.10	0.17	18.91	2.66	1.92	120.03	172.58	96.80	121.12	10.98	178.87	95.49	33.91	29.22	152.92	203.82	155.89	184.89	66.99	61.90
	Sep	13.62	0.11	0.16	18.92	1.67	2.20	126.73	140.67	126.76	143.22	120.42	134.97	101.73	38.71	32.95	143.09	85.78	157.96	181.42	28.20	63.72
	Oct	13.84	0.01	0.08	21.77	2.90	2.56	139.94	188.75	157.65	147.24	214.91	108.56	99.36	15.34	30.53	159.42	58.06	130.81	204.46	129.81	81.65
	Nov	15.90	1.20	0.35	21.98	2.93	2.54	143.33	120.48	155.62	145.67	149.88	124.05	108.24	28.61	29.14	159.14	58.45	101.53	195.95	110.98	84.00
	Dec	16.72	2.33	0.91	25.41	7.06	3.64	166.35	271.54	180.36	162.82	78.75	140.99	113.37	40.41	30.77	163.59	81.78	71.02	196.95	92.75	90.44
2004	Jan	16.32	1.64	1.29	25.25	3.99	4.22	162.19	175.56	189.08	179.39	248.63	173.04	122.75	95.52	44.97	178.84	86.27	71.14	205.14	23.49	89.26
	Feb	16.19	0.11	1.32	26.82	4.19	4.54	160.12	102.30	167.47	179.64	261.79	184.76	120.41	43.97	52.13	184.64	147.27	93.44	221.47	139.33	91.64
	Mar	16.53	0.05	1.03	24.56	0.90	4.04	163.87	6.96	139.09	171.95	62.97	163.04	119.03	15.87	48.94	190.84	136.17	112.87	224.59	173.93	107.37
	Apr	18.88	1.62	0.86	21.17	5.67	3.69	161.14	2.56	71.84	184.99	28.73	150.53	114.94	10.74	41.53	178.70	33.21	100.73	208.58	90.74	106.87
	May	20.13	3.57	1.34	22.49	6.11	4.22	135.01	180.76	73.15	164.84	77.82	107.83	117.06	5.68	19.07	166.81	104.81	105.37	199.13	139.07	135.77
	Jun	22.39	5.98	2.81	22.30	1.99	3.67	135.21	251.39	110.42	162.72	101.04	67.64	120.12	5.21	9.38	162.71	160.81	108.75	200.93	134.59	134.58
	Jul	21.89	2.61	3.45	22.37	0.37	3.54	144.27	150.62	146.33	173.43	102.41	77.50	126.50	25.38	11.75	149.16	148.46	111.82	203.67	16.94	95.34
	Aug	25.69	5.39	4.39	22.47	0.01	2.12	143.92	26.94	152.43	169.89	23.56	76.20	126.06	21.32	14.40	163.28	60.31	118.60	201.85	3.58	73.55
	Sep	27.73	7.69	5.42	23.91	0.59	0.74	155.55	69.49	124.61	191.03	144.76	92.94	135.13	38.18	22.52	169.18	71.68	110.32	207.69	8.97	41.02
	Oct	29.04	9.73	6.36	23.33	0.54	0.38	161.26	73.72	80.19	202.68	236.35	126.77	148.12	106.62	47.88	172.54	106.53	96.75	209.71	12.99	10.62
	Nov	31.87	6.70	7.38	25.67	1.83	0.74	180.91	238.81	102.24	236.64	778.97	295.91	173.09	417.90	146.01	190.99	143.06	95.40	222.60	76.57	25.53
	Dec	33.47	6.84	7.74	25.21	1.20	1.04	193.73	311.45	173.37	235.34	533.36	423.36	180.39	448.06	252.69	196.24	179.13	125.10	220.21	55.43	38.49
2005	Jan	30.73	3.49	6.69	24.66	1.03	1.15	190.32	212.36	209.08	248.78	389.55	484.56	208.87	625.03	399.40	208.51	223.37	163.02	223.60	40.63	46.40
	Feb	30.59	1.77	4.70	26.49	0.60	1.17	195.52	42.33	201.24	250.74	64.15	441.51	211.29	380.33	467.83	228.33	275.12	205.17	221.62	2.08	43.68
	Mar	31.99	1.79	3.47	25.12	0.61	0.86	189.04	8.96	143.78	247.90	49.04	259.03	227.29	380.60	458.50	215.32	179.42	214.26	211.29	29.61	31.94
	Apr	25.63	7.88	3.73	25.00	0.65	0.72	178.96	47.92	77.89	236.40	41.97	136.18	272.50	870.04	564.00	204.84	106.95	196.21	211.86	41.28	28.40
	May	27.47	8.38	4.95	24.94	0.55	0.60	194.31	56.87	39.02	252.75	53.39	52.14	258.45	786.56	604.38	214.86	92.72	163.55	206.47	40.33	28.33
	Jun	28.55	7.14	6.30	25.96	0.23	0.51	210.07	168.57	70.58	256.74	77.53	55.48	282.21	573.98	652.79	215.48	26.99	101.52	212.78	7.96	29.79
	Jul	25.17	2.51	6.48	27.84	1.83	0.81	221.41	343.04	154.10	272.80	223.39	99.07	292.95	215.05	611.41	241.98	252.56	119.81	228.25	87.71	44.32
	Aug	26.89	2.00	5.01	27.92	2.15	1.19	221.70	166.40	183.72	229.79	314.91	167.31	318.63	623.12	549.68	234.17	185.12	139.35	220.32	88.80	56.20
	Sep	27.89	2.17	3.45	29.36	1.94	1.54	242.95	188.41	216.61	236.22	386.17	250.50	318.21	336.20	437.08	262.62	380.82	211.37	224.79	44.61	57.27
	Oct	28.24	1.90	2.14	26.46	1.40	1.83	218.03	130.11	206.99	229.45	429.53	338.50	327.73	223.40	349.44	247.00	144.17	240.67	219.78	16.00	59.28
	Nov	28.24	0.41	1.62	28.32	1.44	1.73	239.54	156.53	160.36	243.28	42.53	293.29	354.08	284.24	366.74	276.20	335.10	261.30	215.90	13.25	40.66
	Dec	27.96	0.04	1.13	29.23	1.78	1.64	262.26	328.33	200.85	264.90	236.15	273.59	309.76	369.17	303.25	302.76	558.75	354.71	216.85	15.97	22.46
Avarage				15.19			32.24	124.72		99.43	278.44		1247.99	101.26		53.45	139.02		140.60	236.65		422.50

		PAKISTAN			PHILIPPINES			SRI LANKA			TAIWAN			THAILAND			TURKEY		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
1993	Jan	99.97			307.73			91.65			145.68			353.77			79.13		
	Feb	93.23			346.72			93.24			192.25			348.41			103.02		
	Mar	90.94			321.81			93.10			207.85			320.87			98.78		
	Apr	87.89	26.29		334.29	279.61		88.75	4.34		197.59	758.88		330.14	237.35		130.71	451.68	
	May	91.92	5.16		328.39	112.05		93.71	5.35		182.69	110.26		320.94	168.11		131.82	310.53	
	Jun	99.83	25.86		326.58	26.62		102.90	35.40		169.57	281.83		333.78	42.97		156.72	563.88	
	Jul	99.91	35.79	23.28	350.49	118.39	134.17	116.11	144.46	47.39	165.95	206.14	339.28	344.75	96.98	136.35	138.28	144.79	367.72
	Aug	93.70	17.14	20.99	361.03	285.66	135.68	117.59	129.04	78.56	162.51	77.88	169.03	354.12	204.50	128.14	174.10	364.54	345.94
	Sep	99.24	8.96	21.94	398.52	896.50	331.79	122.63	70.77	94.92	159.86	17.79	145.91	361.65	144.98	122.36	209.75	926.35	499.89
	Oct	113.74	72.74	33.66	467.28	2789.76	1022.58	140.14	121.96	116.56	171.05	23.34	81.29	467.92	3320.30	941.69	196.30	975.21	602.72
	Nov	127.29	228.41	81.81	486.23	3428.89	1850.20	160.24	373.23	173.75	186.39	142.86	65.47	485.98	4789.36	2114.79	232.47	598.14	716.06
	Dec	161.40	706.63	254.18	665.01	12905.11	5005.07	163.24	359.79	231.44	272.94	2643.74	706.93	624.33	11640.96	4973.90	231.04	305.71	701.35
1994	Jan	167.08	673.30	420.27	597.88	8787.52	6977.82	190.19	422.84	319.46	273.42	3013.46	1455.85	563.18	5225.80	6244.11	186.97	551.51	607.64
	Feb	181.07	521.15	532.37	583.64	5437.42	7639.74	230.21	1051.22	551.77	239.52	1679.49	1869.89	510.51	3764.67	6355.20	125.82	2516.47	992.96
	Mar	181.42	101.74	500.71	563.86	1926.05	7264.02	197.55	759.26	648.28	234.11	445.55	1945.56	466.48	4639.93	6317.84	88.07	4033.17	1851.71
	Apr	170.02	55.14	337.83	585.42	197.80	4087.20	172.27	586.65	704.99	255.90	314.35	1363.21	482.17	1806.38	3859.20	72.23	2602.72	2425.97
	May	157.46	128.42	201.61	639.95	1065.96	2156.81	167.66	824.11	805.31	257.30	135.68	643.77	525.60	716.31	2731.82	76.76	592.08	2436.11
	Jun	169.23	95.78	95.27	578.76	1103.04	1073.21	165.74	217.62	596.91	262.32	156.37	262.99	508.45	697.73	1965.09	94.99	108.16	1834.03
	Jul	166.57	33.24	78.14	598.81	752.91	779.93	167.95	7.60	408.99	300.52	448.82	263.81	562.88	1144.65	1091.27	106.79	258.90	890.46
	Aug	163.25	25.75	70.79	652.96	1203.80	1031.43	176.02	20.77	267.52	313.54	775.57	379.11	621.30	2496.25	1263.73	113.77	262.13	305.32
	Sep	170.05	9.41	41.04	599.54	1010.53	1017.57	192.00	141.57	96.89	323.54	719.12	524.97	595.30	2365.13	1675.94	119.44	110.89	185.02
	Oct	164.41	8.93	19.33	646.07	852.84	955.02	181.75	102.24	68.04	298.18	140.31	520.96	621.65	774.22	1695.06	107.45	35.42	166.83
	Nov	157.29	27.38	17.87	604.03	770.77	959.48	174.50	62.87	81.86	289.82	229.04	466.01	552.65	1055.44	1672.76	117.92	28.74	109.29
	Dec	148.18	89.18	33.73	610.02	449.89	771.01	156.85	219.19	131.47	326.71	336.25	356.18	554.75	1116.69	1327.87	109.60	35.52	52.64
1995	Jan	128.97	235.30	90.20	525.37	2585.61	1164.78	150.57	214.01	149.58	286.64	332.83	259.61	489.04	2932.81	1469.79	96.47	78.02	44.42
	Feb	135.55	160.74	128.15	529.60	2117.93	1481.05	127.42	378.45	218.63	295.50	338.49	309.15	521.48	958.28	1515.80	102.58	85.28	56.89
	Mar	118.82	151.40	159.16	509.78	2028.01	1795.36	129.86	217.02	257.17	297.74	302.18	327.44	494.62	903.80	1477.90	139.60	365.84	141.17
	Apr	113.17	100.73	162.04	515.57	81.65	1703.30	113.80	230.44	259.98	271.85	137.91	277.85	497.01	206.04	1250.23	168.87	1146.70	418.96
	May	106.15	157.28	142.54	599.89	1732.70	1490.07	111.55	86.82	228.18	264.35	281.32	264.97	578.14	1507.71	893.96	167.96	975.08	643.22
	Jun	113.46	27.00	109.10	600.71	2564.87	1601.81	123.33	72.55	151.71	250.59	392.23	278.41	573.10	2128.03	1186.40	158.14	184.72	668.08
	Jul	125.07	61.45	86.61	610.39	1962.64	1585.46	123.64	39.81	107.40	237.14	235.38	261.71	562.97	1423.18	1316.24	168.17	26.16	583.16
	Aug	124.51	83.84	82.39	576.44	207.91	1617.03	118.87	31.77	57.74	214.21	456.09	341.25	531.69	434.15	1373.27	135.38	237.71	355.92
	Sep	111.30	52.19	56.12	549.21	747.63	1370.76	106.82	61.94	51.52	224.99	245.66	332.34	528.47	499.13	1121.12	124.30	407.17	213.94
	Oct	95.85	189.89	96.84	504.53	2000.88	1229.76	108.70	65.08	49.65	216.00	109.97	261.78	519.67	356.39	678.21	135.93	358.16	257.30
	Nov	83.29	322.97	162.22	502.13	1304.47	1065.22	102.91	46.31	51.28	211.14	35.42	211.78	488.35	391.62	420.32	106.83	185.40	297.11
	Dec	91.48	138.30	175.84	538.06	563.08	1154.02	105.62	5.88	44.80	227.92	60.67	112.93	523.34	327.54	393.67	103.13	235.34	296.52
1996	Jan	96.23	36.16	171.83	592.65	1779.82	1412.06	110.62	11.53	32.20	211.56	61.21	66.82	571.31	1172.27	561.96	121.46	224.56	250.87
	Feb	104.97	82.07	144.88	582.82	1756.09	1350.87	112.55	19.69	20.85	215.50	61.49	54.70	538.46	1185.42	769.21	135.66	221.18	216.62
	Mar	96.30	31.60	72.03	571.33	564.42	1165.85	112.55	10.71	11.95	227.29	68.71	63.02	526.97	476.65	790.47	138.61	263.07	236.04
	Apr	97.34	17.65	41.87	586.66	80.68	1045.25	103.03	20.50	15.61	284.09	1132.79	331.05	536.64	372.93	801.82	131.67	56.06	191.22
	May	109.25	38.50	42.46	652.07	1331.09	933.07	99.46	44.72	23.91	274.19	1150.97	603.49	545.34	57.44	523.11	122.35	50.09	147.60
	Jun	104.96	38.49	31.56	663.33	2124.91	1025.28	88.25	100.79	44.18	310.57	1206.98	889.86	514.34	177.05	271.02	135.79	50.40	104.91

		PAKISTAN			PHILIPPINES			SRI LANKA			TAIWAN			THAILAND			TURKEY		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
	Jul	87.89	87.97	45.65	613.59	1246.93	1195.90	82.04	94.97	65.25	285.53	240.11	932.71	440.38	2273.90	720.33	115.73	82.04	59.65
	Aug	84.40	151.55	79.13	649.31	463.55	1291.62	81.73	68.69	77.29	297.43	244.53	710.65	445.87	2671.83	1295.05	113.74	99.24	70.44
	Sep	80.41	116.75	98.69	633.57	456.68	1073.02	84.20	9.02	68.37	304.50	115.73	451.84	444.68	1255.01	1594.45	124.56	101.13	83.20
	Oct	79.78	14.28	92.64	584.93	771.05	734.55	87.75	7.70	45.09	294.88	61.53	165.47	358.77	1806.42	2001.79	130.15	58.97	85.34
	Nov	83.75	5.41	72.00	613.95	769.45	615.18	89.41	11.99	24.35	311.49	55.98	119.44	367.35	2265.63	1999.72	137.50	100.28	89.90
	Dec	73.77	17.28	38.43	628.28	475.35	618.13	88.38	5.11	8.46	316.56	88.21	80.36	324.72	2567.02	1973.52	136.00	34.99	73.84
1997	Jan	88.94	41.03	19.50	688.87	1917.90	983.44	89.35	0.64	6.36	330.09	211.77	104.37	305.85	832.46	1867.88	207.54	1341.94	384.04
	Feb	93.82	73.69	34.35	664.25	1160.11	1080.70	91.76	2.06	4.95	350.17	298.70	163.66	279.82	1359.22	1756.08	207.73	1675.23	788.11
	Mar	87.81	74.24	51.56	643.75	688.91	1060.57	91.60	2.80	2.66	346.65	242.41	210.27	275.39	535.86	1323.64	200.47	1210.04	1065.55
	Apr	84.56	14.74	50.93	534.58	4633.40	2100.08	105.71	55.98	15.37	368.71	250.95	250.96	261.12	348.26	768.95	168.43	350.21	1144.35
	May	83.95	20.45	45.78	555.23	4108.35	2647.69	104.44	60.05	30.22	353.44	94.38	221.61	230.09	505.04	687.09	182.57	314.66	887.53
	Jun	88.74	5.59	28.76	551.51	2415.65	2961.58	118.59	121.65	60.12	400.74	579.41	291.79	209.95	877.13	566.57	199.22	231.01	526.48
	Jul	115.08	219.56	65.09	483.65	1087.65	3061.26	133.92	188.96	106.66	433.84	1274.63	549.84	230.20	446.12	544.14	193.05	181.51	269.35
	Aug	98.63	189.12	108.68	342.01	9930.35	4385.50	120.60	145.58	129.06	415.96	1187.93	784.09	151.92	1368.39	799.17	187.81	50.82	194.50
	Sep	104.95	122.26	134.13	301.33	13836.93	6817.64	115.80	64.61	130.20	366.90	806.63	962.15	169.85	1289.71	995.34	231.01	376.22	209.89
	Oct	99.19	58.21	147.29	264.16	9214.13	8517.26	105.36	140.48	134.91	286.67	4335.04	1901.06	112.01	2416.63	1380.21	244.29	777.30	346.46
	Nov	93.57	21.65	97.81	258.81	1487.81	8617.30	95.48	125.51	119.05	289.37	3967.11	2574.18	100.59	1068.38	1535.78	239.80	669.52	468.47
	Dec	91.61	36.09	59.55	232.65	801.16	6335.00	98.57	81.04	102.91	294.75	1479.66	2647.11	83.36	1405.75	1545.12	287.50	633.99	614.26
1998	Jan	83.56	41.84	39.45	230.11	308.02	2952.78	92.89	28.95	93.99	278.36	46.73	2457.14	111.91	182.56	1268.33	274.09	533.88	653.67
	Feb	85.12	23.73	30.83	294.24	889.68	871.66	99.18	8.50	61.00	337.52	672.17	1541.42	134.35	456.87	778.39	246.74	507.39	586.19
	Mar	77.52	33.54	33.80	313.47	1813.72	953.14	103.09	17.64	34.03	319.49	685.57	721.03	119.39	458.01	625.80	224.65	789.42	616.17
	Apr	77.67	15.59	28.68	282.37	1272.54	1070.99	114.22	80.30	33.84	289.38	738.50	535.74	107.65	137.66	308.77	275.93	597.10	606.95
	May	48.25	266.34	84.80	272.12	315.17	1072.78	90.23	98.88	51.33	261.60	1119.61	803.96	78.13	567.33	404.97	229.91	533.20	606.78
	Jun	36.28	439.91	188.85	222.33	1431.24	1208.17	68.98	377.16	143.49	244.80	1073.25	904.23	56.52	812.22	493.80	241.21	531.86	612.90
	Jul	35.55	388.19	277.51	200.84	1531.57	1137.63	73.43	419.97	244.07	240.48	491.45	855.70	59.24	555.12	518.08	247.66	383.86	511.51
	Aug	37.29	35.74	282.55	146.32	2716.38	1498.59	54.96	211.28	276.82	199.56	693.07	844.34	44.03	198.50	533.29	150.69	2029.60	869.63
	Sep	42.88	11.09	218.73	165.37	1172.85	1713.01	55.14	90.29	274.67	216.27	451.65	677.35	60.04	55.36	405.30	126.84	3823.52	1692.21
	Oct	30.22	27.23	115.56	237.06	1606.49	1756.82	55.00	84.58	201.53	244.05	442.05	519.55	83.22	261.37	267.59	121.46	3447.79	2421.19
	Nov	40.97	31.20	26.31	270.48	3442.83	2234.64	67.43	38.45	106.15	259.50	727.66	578.60	96.65	551.51	266.69	135.63	163.06	2365.99
	Dec	36.13	31.96	25.37	261.96	2276.93	2124.78	71.66	72.82	71.53	231.54	337.66	489.75	92.74	269.32	284.39	133.59	41.94	1869.08
1999	Jan	33.05	21.18	27.89	259.37	203.06	1882.33	65.19	50.04	61.47	224.69	234.23	435.40	94.95	35.96	279.54	125.81	43.95	924.19
	Feb	33.96	12.52	24.22	259.82	26.76	1487.39	62.72	14.41	43.93	235.48	229.13	382.17	85.91	22.21	219.75	178.39	563.49	203.11
	Mar	41.43	14.10	19.94	273.40	43.61	637.59	56.15	41.11	44.59	258.31	212.27	253.32	91.03	14.80	85.57	200.85	1290.99	485.09
	Apr	42.08	22.90	17.68	338.88	1436.70	427.53	57.93	17.49	30.76	280.85	624.05	324.92	130.34	407.86	120.21	225.05	1792.47	922.72
	May	44.92	21.90	17.86	320.91	1419.60	731.67	59.24	7.73	20.19	269.10	372.75	359.55	124.85	519.56	241.11	199.96	363.49	1002.61
	Jun	37.84	8.48	16.85	331.22	864.73	941.16	53.82	5.50	17.96	328.34	952.57	540.41	146.64	546.02	372.06	189.61	225.41	918.09
	Jul	46.47	14.38	16.92	299.14	297.53	1004.64	66.59	28.34	14.76	287.74	662.12	652.87	127.99	94.51	391.99	213.81	241.34	655.68
	Aug	44.19	14.44	14.80	270.91	712.04	823.47	61.75	28.25	17.45	323.08	807.92	698.84	124.00	113.48	318.39	177.47	238.14	267.10
	Sep	43.85	13.61	12.73	252.60	1178.72	763.25	60.81	27.70	22.45	301.79	356.69	694.83	99.61	373.95	281.99	204.51	257.72	240.65
	Oct	43.35	1.91	11.08	256.84	441.86	657.54	56.80	16.19	25.12	312.12	226.70	513.36	113.45	160.80	185.68	217.32	325.20	265.60
	Nov	45.11	0.55	7.63	244.85	119.45	613.02	60.72	4.82	19.24	315.31	77.82	367.28	118.62	109.53	189.44	266.99	1405.47	556.63
	Dec	51.39	13.83	7.48	268.06	93.81	458.46	64.68	10.37	14.77	350.81	455.09	279.08	136.09	227.28	217.89	460.03	13999.51	3996.98

		PAKISTAN			PHILIPPINES			SRI LANKA			TAIWAN			THAILAND			TURKEY		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
2000	Jan	65.09	97.16	28.36	244.61	125.71	195.21	59.91	10.54	10.48	408.17	1992.31	687.98	132.25	116.51	153.53	482.37	17980.90	8427.77
	Feb	69.19	128.21	59.94	205.45	674.66	253.41	57.82	8.27	8.50	390.74	1730.27	1063.87	102.00	238.26	172.89	459.34	10140.33	10881.55
	Mar	72.65	86.82	81.50	203.06	996.91	472.77	49.87	38.17	16.83	405.92	705.05	1220.68	112.34	263.26	211.33	431.05	441.96	10640.68
	Apr	68.96	9.56	80.44	188.09	582.05	594.83	47.53	36.08	23.26	359.50	503.33	1232.74	105.21	184.22	200.56	537.55	2039.14	7650.58
	May	54.14	67.83	73.10	169.75	270.84	631.11	47.08	24.81	26.83	366.92	458.77	849.35	83.13	155.45	210.30	464.31	2062.98	3671.10
	Jun	52.35	105.58	67.45	171.19	247.71	524.38	51.88	4.95	26.00	339.51	774.45	610.40	86.51	201.69	201.16	409.23	3149.38	1923.37
	Jul	52.18	65.34	62.08	146.52	291.78	348.09	50.32	5.24	17.77	330.70	285.49	505.51	67.23	242.98	196.08	381.30	4746.19	2999.42
	Aug	49.77	3.23	60.49	158.56	131.70	235.51	46.65	6.41	10.35	309.58	564.24	520.74	76.52	72.15	168.07	347.43	2444.44	3100.75
	Sep	47.57	5.12	44.82	146.30	140.24	202.86	48.52	5.11	5.43	259.81	1272.83	724.25	61.46	120.47	159.32	290.97	2589.82	3232.46
	Oct	45.74	7.76	20.36	121.19	247.05	202.69	44.48	6.27	5.76	226.12	2248.87	1092.86	59.45	58.54	123.53	340.75	1388.44	2792.22
	Nov	37.69	27.71	10.95	134.11	257.61	194.15	34.47	39.23	14.25	208.69	1972.92	1514.71	61.89	61.89	78.26	225.65	3171.42	2398.53
	Dec	44.58	18.61	14.80	146.67	146.13	197.76	36.28	44.52	23.78	191.73	846.27	1585.22	58.93	2.13	60.76	247.66	2585.03	2433.68
2001	Jan	42.07	12.70	16.69	174.08	510.14	290.23	32.81	26.82	29.21	247.78	575.93	1411.00	77.13	74.22	49.20	285.69	2540.26	2421.29
	Feb	39.93	8.67	16.92	165.13	324.20	309.52	34.76	2.03	28.15	229.82	597.93	998.26	74.21	80.48	54.68	167.86	2427.23	2680.98
	Mar	36.56	11.53	12.88	144.66	205.12	296.40	31.90	3.86	19.31	226.28	548.45	642.15	61.35	82.75	59.90	137.42	4730.04	3070.64
	Apr	37.87	5.82	9.68	139.22	273.45	328.23	29.85	4.15	9.21	210.30	236.48	489.70	62.27	65.55	75.75	198.74	4089.04	3446.64
	May	36.33	2.72	7.18	141.72	140.24	235.75	29.87	5.36	3.85	195.65	247.37	407.56	62.79	36.77	66.39	172.57	631.78	2969.52
	Jun	34.70	1.69	5.44	140.44	5.45	156.06	30.22	0.95	3.58	188.70	277.87	327.54	64.22	1.43	46.63	162.41	643.90	2523.69
	Jul	30.42	10.31	5.13	134.22	10.78	107.48	29.59	0.07	2.63	167.98	309.71	267.86	57.61	8.19	27.99	137.51	642.14	1501.72
	Aug	31.30	7.79	5.63	127.80	40.95	49.36	28.70	0.42	1.70	173.97	163.91	249.72	68.89	21.55	16.99	132.03	378.98	574.20
	Sep	26.33	11.85	7.91	117.34	97.36	38.63	27.56	1.33	0.69	136.20	489.64	310.28	56.38	34.33	16.37	90.74	883.33	637.09
	Oct	36.14	16.23	11.54	102.62	190.43	84.88	40.91	38.44	10.07	150.61	293.93	314.30	54.09	43.48	26.89	109.79	462.36	591.70
	Nov	33.96	17.87	13.43	113.52	108.13	109.22	40.62	53.42	23.40	171.26	320.20	316.92	61.92	43.44	35.70	135.63	438.19	540.71
	Dec	28.98	20.20	16.54	117.77	49.82	111.44	49.38	81.08	43.57	208.55	987.15	522.73	60.64	13.33	33.64	164.12	1016.15	700.01
2002	Jan	38.04	15.28	17.40	137.57	213.22	140.40	41.75	17.38	47.58	218.29	1005.15	651.61	72.13	55.61	38.96	175.51	872.55	697.31
	Feb	43.25	36.76	22.53	141.06	191.81	140.75	45.97	16.17	42.01	207.92	429.23	685.43	77.90	68.73	45.28	140.35	362.91	672.45
	Mar	43.24	45.30	29.39	141.90	129.06	145.98	46.53	9.90	31.13	226.57	78.63	625.04	77.35	64.17	50.46	154.23	222.80	618.60
	Apr	42.87	6.48	25.95	129.89	29.98	141.02	47.70	6.72	12.54	221.54	62.08	393.77	76.42	6.88	48.85	150.04	220.11	419.59
	May	35.96	12.86	25.35	123.44	80.25	107.77	54.77	16.66	12.36	212.72	70.92	160.22	86.20	20.53	40.08	126.92	147.10	238.23
	Jun	38.62	12.29	19.23	107.08	210.66	112.48	57.12	27.14	15.10	194.23	202.36	103.50	81.47	19.98	27.89	100.00	622.33	303.09
	Jul	40.19	8.38	10.00	103.49	161.50	120.59	55.91	17.87	17.10	181.28	328.59	165.99	76.96	20.80	17.05	103.05	545.80	383.84
	Aug	47.18	22.98	14.13	99.48	110.54	140.74	62.38	11.32	18.25	172.19	309.11	227.75	74.11	28.07	22.34	97.10	186.39	375.41
	Sep	45.59	17.08	15.18	100.89	11.14	123.46	69.68	39.28	23.90	146.11	414.08	313.54	67.34	35.04	25.97	88.73	37.96	348.12
	Oct	51.81	22.97	17.85	89.25	38.96	80.53	65.04	33.05	25.38	162.18	226.89	319.67	73.31	16.34	25.06	102.95	45.59	203.93
	Nov	52.39	11.36	18.60	86.48	52.21	53.21	62.52	11.62	23.82	165.60	122.79	268.22	76.00	13.99	23.36	145.08	629.95	224.97
	Dec	64.44	62.10	28.38	81.87	65.71	42.01	64.07	9.49	23.36	155.63	73.58	209.34	75.39	15.62	20.25	104.23	588.64	325.54
2003	Jan	59.07	35.92	33.09	85.36	9.33	41.56	62.48	1.57	13.93	174.52	61.93	121.30	80.82	10.08	14.01	112.03	390.10	413.57
	Feb	55.94	26.10	33.87	79.87	9.38	34.16	57.59	7.94	7.66	153.50	94.09	88.10	78.38	6.12	11.45	121.65	313.91	480.65
	Mar	62.66	14.33	34.61	81.85	5.21	22.41	57.98	10.51	7.38	151.24	114.16	85.94	80.35	6.08	9.47	91.43	163.14	363.95
	Apr	63.49	12.08	22.11	87.50	11.75	8.92	64.90	12.65	8.17	147.04	150.28	105.12	81.57	1.86	6.03	121.16	199.75	266.72
	May	66.30	19.27	17.94	85.92	12.47	9.70	71.03	40.85	17.98	162.37	41.82	100.09	91.62	34.90	12.24	131.24	297.89	243.67
	Jun	70.74	13.29	14.74	100.02	61.39	22.71	101.32	364.81	107.20	173.95	145.88	113.03	101.30	95.93	34.69	128.74	335.41	249.05

		PAKISTAN			PHILIPPINES			SRI LANKA			TAIWAN			THAILAND			TURKEY		
Year	Month	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA	Index	VAR	MA
	Jul	80.21	53.61	24.56	99.66	57.91	35.88	98.05	343.39	190.42	193.87	389.58	181.89	103.94	103.57	59.07	125.67	18.83	212.97
	Aug	89.38	105.57	47.94	94.33	43.27	43.76	101.38	215.91	241.24	210.24	449.90	256.79	114.60	89.28	80.92	142.15	51.44	175.89
	Sep	80.28	57.90	57.59	103.31	13.82	44.09	121.31	113.33	259.36	211.45	308.14	323.38	124.75	115.27	101.02	164.73	315.99	180.42
	Oct	74.84	36.39	63.37	110.35	45.29	40.07	128.34	220.24	223.22	225.96	172.15	329.94	132.29	151.93	115.01	188.68	751.33	284.40
	Nov	79.38	37.09	59.24	102.29	43.07	36.36	108.73	147.51	174.25	212.74	53.49	245.92	134.86	82.65	109.78	176.23	391.42	377.54
	Dec	84.48	15.66	36.76	113.79	30.80	33.24	91.04	267.77	187.21	217.90	43.35	144.28	176.61	546.87	224.18	231.80	858.97	579.42
2004	Jan	88.80	36.82	31.49	118.65	47.45	41.65	104.64	237.69	218.30	236.98	111.63	95.16	161.63	459.66	310.28	224.24	727.47	682.29
	Feb	88.00	18.37	26.98	114.25	48.87	42.55	98.91	58.83	177.95	246.33	250.28	114.69	164.21	308.89	349.52	245.45	906.59	721.11
	Mar	89.97	5.58	19.11	109.65	13.54	35.17	98.13	31.09	148.84	240.02	149.94	138.80	152.91	95.86	352.82	260.96	261.13	688.54
	Apr	91.17	1.92	15.67	120.86	24.64	33.63	90.93	31.59	89.80	223.91	89.16	150.25	150.46	44.24	227.16	215.06	429.62	581.20
	May	89.17	1.78	6.91	117.52	22.85	27.48	98.15	14.06	33.89	217.77	179.28	167.16	148.83	48.25	124.31	192.24	945.64	635.74
	Jun	85.27	6.53	3.95	122.91	33.98	23.75	99.39	14.88	22.90	210.69	156.51	143.72	149.71	3.07	47.85	208.12	870.33	626.68
	Jul	85.17	8.86	4.77	122.30	5.81	21.82	100.75	19.18	19.93	192.12	189.71	153.66	146.13	3.56	24.78	228.76	230.70	619.07
	Aug	83.91	5.20	5.59	119.68	6.19	17.21	95.91	4.22	13.09	204.71	118.16	160.91	143.91	6.96	15.46	232.06	348.43	598.78
	Sep	81.81	2.58	5.79	134.77	45.11	22.77	97.34	4.60	10.72	204.89	61.35	131.43	149.01	7.17	5.19	249.92	293.65	435.78
	Oct	77.81	10.39	6.76	140.26	97.17	38.57	101.74	7.63	8.91	204.34	39.30	102.13	147.87	4.93	5.65	266.37	303.41	294.05
	Nov	84.22	8.73	6.73	140.93	97.65	61.53	99.19	6.34	5.70	217.39	40.63	64.86	162.74	67.27	21.58	269.97	301.62	311.78
	Dec	91.76	34.44	14.04	141.23	9.29	62.30	98.14	3.67	5.56	232.14	171.64	78.23	169.47	111.74	47.78	320.96	942.60	460.32
2005	Jan	101.27	102.03	38.90	159.32	85.87	72.49	117.91	85.27	25.73	225.06	141.58	98.29	176.70	150.91	83.72	349.61	1640.38	797.00
	Feb	123.25	286.27	107.87	165.24	155.61	87.11	121.86	152.91	62.05	238.41	82.20	109.01	190.91	145.59	118.88	378.58	2143.20	1256.95
	Mar	115.59	199.73	155.62	153.40	105.15	88.98	121.19	125.92	91.94	224.28	44.17	109.90	169.67	101.21	127.36	321.63	750.45	1369.16
	Apr	109.68	86.35	168.60	148.03	55.18	100.45	132.84	42.16	101.57	221.27	58.01	81.49	162.86	143.93	135.41	288.95	1470.39	1501.10
	May	107.62	49.12	155.37	152.10	54.62	92.64	137.07	63.17	96.04	230.25	57.15	60.38	160.78	189.63	145.09	313.31	1438.77	1450.70
	Jun	116.87	20.12	88.83	147.59	8.45	55.85	134.01	48.43	69.92	235.52	40.23	49.89	160.31	18.67	113.36	336.35	393.72	1013.33
	Jul	110.84	15.78	42.84	148.96	4.14	30.60	134.08	3.26	39.25	235.57	45.38	50.19	162.89	1.85	88.52	373.99	1308.47	1152.84
	Aug	120.82	35.10	30.03	144.74	9.36	19.15	137.97	4.15	29.75	219.27	58.90	50.41	169.90	19.63	57.45	385.19	1108.89	1062.46
	Sep	126.22	42.05	28.26	146.28	3.27	6.31	163.81	205.83	65.42	220.60	81.56	56.52	176.39	52.57	23.18	416.93	1106.10	979.30
	Oct	127.87	58.94	37.97	151.44	8.78	6.39	163.05	252.94	116.54	205.33	152.79	84.66	164.09	38.36	28.10	394.32	332.08	963.89
	Nov	137.42	47.85	45.99	167.54	108.79	32.55	149.29	152.17	153.77	223.73	66.45	89.93	162.58	39.50	37.51	471.38	1494.48	1010.39
	Dec	143.59	67.22	54.01	169.39	133.16	63.50	128.27	276.22	221.79	239.76	199.28	125.02	177.68	63.24	48.42	486.57	1916.83	1212.37
Avarage		82.47		67.22	301.43		1063.20	93.62		94.54	250.84		486.09	225.60		666.63	202.91		1082.01

Appendix – C

Correlation and regression analysis

i) Summary results of correlation and regression between index and turnover of CSE:

Regression Statistics	
Correlation: R	0.420025
R Square	0.176421
Adjusted R Square	0.084912
Standard Error	1079.115
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2245037.214	2245037	1.92792	0.198387385
Residual	9	10480407.09	1164490		
Total	10	12725444.31			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	292.7133	829.6788039	0.352803	0.73236	-1584.150508	2169.5772
X Variable 1	0.099416	0.07159974	1.388494	0.19839	-0.062554068	0.2613857

[The correlation and regression results indicate an average positive relationship between all share price index and turnover.]

$$Y = 292.71 + 0.09X_1$$ Where, Y = Index; X_1 = Turnover

ii) Summary results of correlation and regression between index and trading volume of CSE:

Regression Statistics	
Correlation: R	0.1927
R Square	0.0371
Adjusted R Sqr.	-0.0699
Standard Error	1166.8051
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	472536.2037	472536.2	0.3471	0.5703
Residual	9	12252908.1	1361434		
Total	10	12725444.31			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	1044.2022	630.4777	1.6562	0.1321	-382.0375	2470.4418
X Variable 1	0.0000	0.0000	0.5891	0.5703	0.0000	0.0000

[The correlation coefficient indicates a lower degree positive relationship and regression result indicates no relationship between all share price index and trading volume.]

$Y = 1044.20 + 0.00X_1$ Where, Y = Index; X_1 = Volume of transaction

iii) Summary results of correlation and regression between index and turnover of DSE:

Regression Statistics	
Correlation: R	0.1565
R Square	0.0245
Adjusted R Square	-0.0642
Standard Error	612.2358
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	103529.5	103529.5	0.2762	0.6096
Residual	11	4123159	374832.6		
Total	12	4226689			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	879.1538	297.0618	2.9595	0.0130	225.3251	1532.9824
X Variable 1	0.0045	0.0086	0.5255	0.6096	-0.0143	0.0233

[The correlation and regression results indicate low degree positive relationship between all share price index and turnover.]

$Y = 879.15 + 0.0045X_1$ Where, Y = Index; X_1 = Turnover

iv) Summary results of correlation and regression between index and trading volume of DSE:

Regression Statistics	
Correlation: R	0.3503
R Square	0.1227
Adjusted R Square	0.0429
Standard Error	580.6056
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	518557.6	518557.6	1.5382772	0.240676571
Residual	11	3708131	337102.8		
Total	12	4226689			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	859.1381	200.4812	4.2854	0.0013	417.8820	1300.3943
X Variable 1	0.0000	0.0000	1.2403	0.2407	0.0000	0.0000

[The correlation and regression results indicate low degree positive relationship between all share price index and trading volume.]

$Y = 859.13 + 0.00X_1$ Where, Y = Index; X_1 = Volume of transaction

(i) Time series regression analysis:

i. The time series regression line of all share price index of DSE over the period of 1993-2005:

$Y = 631.59 + 53.67t$ where, Y= all share price index, t= time i.e. year

ii. The time series regression line of all share price index of CSE over the period of 1993-2005:

$Y = -341.06.59 + 282.25t$ where, Y= all share price index, t= time i.e. year

iii.The time series regression line of turnover of DSE over the period of 1993-2005:

$Y = -2402.31 + 4410.32t$ where, Y= turnover, t= time i.e. year

iv.The time series regression line of turnover of CSE over the period of 1993-2005:

$Y = 5092.41 + 927.85t$ where, Y= turnover, t= time i.e. year

v. The time series regression line of trading volume of DSE over the period of 1993-2005:

$Y = -812030426.1 + 255500369.2t$ where, Y= trading volume, t= time i.e. year

vi. The time series regression line of trading volume of CSE over the period of 1993-2005:

$Y = 94386625 + 33723153t$ where, Y= trading volume, t= time i.e. year

Appendix D

Regression Analysis: PRICE versus LSTC, LSTS, IPOS, BVPS, EPS, DPS

The regression equation is
PRICE = 774 - 1.82 LSTC + 0.316 LSTS - 1.03 IPOS - 2.04 BVPS + 13.4 EPS - 12.3 DPS

Predictor	Coef	SE Coef	T	P
Constant	773.9	155.8	4.97	0.000
LSTC	-1.8225	0.7278	-2.50	0.013
LSTS	0.31649	0.06164	5.13	0.000
IPOS	-1.035	2.264	-0.46	0.648
BVPS	-2.0443	0.4198	-4.87	0.000
EPS	13.397	3.616	3.70	0.000
DPS	-12.251	3.153	-3.89	0.000

S = 106.8 R-Sq = 35.5% R-Sq(adj) = 32.9%
PRESS = 1828837 R-Sq(pred) = 30.53%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	6	934201	155700	13.66	0.000
Residual Error	149	1698333	11398		
Total	155	2632534			

Durbin-Watson statistic = 0.22

Regression Analysis: PRICE versus LSTC, LSTS, BVPS, EPS, DPS

The regression equation is
PRICE = 713 - 1.58 LSTC + 0.310 LSTS - 1.91 BVPS + 12.1 EPS - 12.5 DPS

Predictor	Coef	SE Coef	T	P
Constant	713.01	80.43	8.86	0.000
LSTC	-1.5753	0.4855	-3.24	0.001
LSTS	0.30983	0.05974	5.19	0.000
BVPS	-1.9075	0.2933	-6.50	0.000
EPS	12.079	2.175	5.55	0.000
DPS	-12.461	3.112	-4.00	0.000

S = 106.5 R-Sq = 35.4% R-Sq(adj) = 33.2%
PRESS = 1814066 R-Sq(pred) = 31.09%

Analysis of Variance

Source	DF	SS	MS	F	P
Regression	5	931821	186364	16.44	0.000
Residual Error	150	1700713	11338		
Total	155	2632534			

Durbin-Watson statistic = 0.22