STOCK MARKET EFFICIENCY IN NEPAL

A THESIS
SUBMITTED TO
THE FACULTY OF MANAGEMENT
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By
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DECLARATION

I hereby declare that the work reported in this thesis entitled **"Stock Market Efficiency in Nepal"** submitted to the Faculty of Management, Tribhuvan University is my original work done for the degree of Doctor of Philosophy under the supervision of Dr. Radhe Shyam Pradhan, Professor, Faculty of Management, Central Department of Management, Kirtipur. Other works on the subject have been duly acknowledged at the relevant places, and for which I am indebted to them. The present study has not been submitted elsewhere for any other degree or diploma in full or part.

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RECOMMENDATION OF SUPERVISOR

I certify that the thesis entitled "**Stock Market Efficiency in Nepal**" submitted by Mr. Gopal Prasad Bhatta to the Faculty of Management, Tribhuvan University for the degree of Doctor of Philosophy was completed under my supervision and guidance. The thesis is the candidate's original work. I have carefully read the substance of his thesis.

To the best of my knowledge, the candidate has also fulfilled all other requirements of the Ph.D. program of the Faculty of Management, Tribhuvan University.

I, therefore, recommend that this thesis be considered for the award of the Ph.D. degree.

Dr. Radhe Shyam Pradhan

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ACRONYMS

AAR	Average Abnormal Return
ACF	Autocorrelation Function
ADR	American Depository Receipts
APT	Arbitrage Pricing Theory
ASE	American Stock Exchange
BOD	Board of Directors
BSE	Bombay Stock Exchange
CAAR	Cumulative Average Abnormal Return
CAPM	Capital Asset Pricing Model
CD	Convertible Debt
CMER	Cumulative Market Excess Return
DJIA	Dow Jones Industrial Average
EMH	Efficient Market Hypothesis
EPS	Earnings per Share
FCD	Fully Convertible Debentures
FFJR	Fama, Fisher, Jensen and Roll
GARCH	Generalized Autoregressive Heterscedasticity
GoN	Government of Nepal
I.I.D	Independent and Identically Distributed
IPO	Initial Public Offerings
KLSE	Kuala Lumpur Stock Exchange
NEPSE	Nepal Stock Exchange
NRB	Nepal Rastra Bank
NYSE	New York Stock Exchange
OLS	Ordinary Least Square
OTC	Over the counter
PE	Price Earnings
RWH	Random Walk Hypothesis
SAD	Seasonal Affective Disorder
SAR	Standardized Abnormal Return
SD	Standard Deviation
SEBO/N	Security Board/Nepal
SRV	Security Returns Variability
SUE	Standardized Unexpected Earnings
TVA	Trading Volume Activity
UK	United Kingdom
USA	United States of America

WEMH	Weak form Efficient Market Hypothesis
WPI	Wholesale Price Index

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Chapter I
INTRODUCTION

1.1 General background

The stock market plays an important role in the financial system of any country. The activities of buying and selling of shares on the securities market are extremely important for the efficient allocation of capital through proper pricing of capital and risk (Islam and Khaled, 2005). In an economy like Nepal, efficient allocation of scarce resources and encouragement of foreign private investment are both of vital importance. Success of an increasing privatization of the economy will depend on the presence of an active and efficient share market.

The concept of efficient market hypothesis (EMH) has been one of the most dominant themes in financial research for explaining the share price behavior. The increasing globalization of the financial markets has heightened this concept in emerging markets as well. Several studies have focused on predictability of returns in the less matured and developing stock markets (Abraham *et al.,* 2002). In the context of stock markets, the term "efficiency" has been used in a rather restricted sense to reflect only the informational efficiency of such markets. However, a precondition for this strong version of hypothesis is that information and trading costs, the costs of getting prices to reflect information, are always zero (Grossman and Stiglitz, 1980). A weaker and economically more sensible version of the efficiency hypothesis states that prices reflect information to that point where the marginal benefits of acting on information do not exceed the marginal costs (Jensen, 1978). As long as access to relevant information is not monopolistic, competitive trading by investors will ensure efficiency that prices this information.

Accordingly, in market efficiency hypothesis security prices fully reflect all available information (Fama, 1965, 1991). The efficient market theorists believe that the process of adjustment of stock prices to information is very quick. Thus, market efficiency has two dimensions: (i) the set of information that the market reflects into the prices, and (ii) the speed and the qualities of adjustment of prices to new information. The degree of efficiency shown by a market is measured by the speed with which the market incorporates the new information into its price structures. The efficient market theorists postulate that in an efficient market the speed of adjustment of prices to new information is very rapid.

Traditionally, it is common to distinguish among three versions of the EMH: the weak, semi-strong, and the strong forms of the hypothesis. They tend to describe different degrees of market efficiency according to the type of information being reflected in prices. The weak form hypothesis asserts that historical price and volume data should already be reflected in current prices and should be of no value in predicting future price changes. Thus, weak form market efficiency suggests that prices traded in securities market that is weak form efficient cannot be predicted by using historical price information (Belaire-Franch and Opong, 2005). The semi-strong form hypothesis states that all publicly available information regarding the prospects of the firm must be reflected already in the stock price. In the strong form, stock prices reflect all information relevant to the firm, public or private.

The three levels of efficiency, however, are not independent on one another. That is to say if the market is efficient in the semi-strong sense, it must be efficient in the weak sense also, as price is one form of published information. Further, if past series of prices could be used to predict future prices, it would imply that the information contained in past prices has not been fully reflected into the current prices. Similarly, if the market is efficient at strong sense, it must also be efficient at the semi-strong and weak levels; otherwise prices do not reflecting all relevant information.

The EMH describes different levels of market efficiency in order to explain the stock price behavior focusing on the kind of information adjustment. In an efficient market the stock prices are not only good estimates of real worth of securities, but also the best available at any point in time. In such an environment, therefore, one cannot use available information to obtain consistently higher than normal returns on investment.

The weak-form EMH is related to, but not identical with, an idea from the 1960s called the random walk hypothesis. Actually, the earliest known study on the distribution of security prices was carried out by Bachelier (1900) who concluded that current prices of commodity was also an unbiased estimate of its future price. In the decade 1960s, however, a 'counter theory' first labeled 'random walk' and later a theory of ‘efficient capital markets’ has been advanced to explain fluctuations in stock prices.

The random walk hypothesis or weakly efficient market hypothesis has been extensively examined. The bulk of research into stock market price behavior has been largely confined to analyses of the New York and the London Stock Exchange and such classic studies as Fama (1965) and Granger and Morgenstern (1970) are well documented. However, random walk studies of some smaller and often less developed stock markets have overwhelmingly appeared in the literature. The results of the test on well-informed and organized US stock markets validate the applicability of random walk hypothesis to describe the movement of prices. Likewise, in UK, the results are decisive suggesting that London Stock Market is less efficient than New York (Dryden, 1970). As far as Indian market is concerned, there have been some studies that have examined the weak level of efficiency of the market. The major contributors of this research have been Rao and Mukherjee (1971), Sharma and Kennedy (1977), Sharma (1983), and Gupta (1985). With relatively few exceptions; the results of most studies in developing markets indicate that for the particular samples and time periods studied, prices in many stock markets fluctuate randomly.

An efficient market in its semi-strong form, on the other hand, holds when current stock prices contain all the publicly available information. In semi-strong form efficient market, information in financial newspapers and other corporate publications contain nothing of value to professional investors. Assuming that managers possess inside information about their firm's future prospects, they may use various signaling devices to convey this information. Two of the most important signaling devices are earnings and dividend figures (Aharony and Swary, 1980). The effects of such a signaling devices, particularly the dividend announcement, provides an insight into the price adjustment mechanism in stock markets like that of Nepal.

A great deal of work has been undertaken in the areas of market reaction to dividend announcements and the information content of dividend hypothesis. The first study to look at this issue was the stock split study by Fama *et al.* (1969). Later, the effect of unexpected dividend changes on share prices have been studied by Pettit (1972), Watts (1973), Kwan (1981), and Aharony and Swary (1980). The evidence in support of the informational content of dividend is overwhelmingly observed in the studies. The studies also revealed that unexpected dividend changes do convey information to the market about expected future cash flows of the enterprises. Though these findings support the efficiency in big markets, still the issues need to be addressed in small markets like that of Nepal.

Efficiency of stock market was once virtually taken for granted; it is now being seriously questioned again, primarily due to evidence on the return reversal behavior of stock prices. Departures from market efficiency in the form of anomalies have attracted attention of many studies. Evidence against the random walk hypothesis (RWH) for stock returns in developed markets are, among others, reported by Fama and French (1988) and Lo and MacKinlay (1988). Fama (1998) maintains that most return anomalies in the major stock markets are chance results that tend to disappear in the long term with a reasonable change in the methodology, hence supporting the view that mature capital markets are generally efficient. However, in the past two decades, much evidence has accumulated in "calendar anomalies" in developed and emerging markets followed by Fama (1970). Calendar anomalies are empirical results that seem to be inconsistent with maintained theories of asset pricing behavior (Schwert, 2002). The evidence of a growing number of these anomalous results led to a doubt on EMH that includes the seasonality in stock returns.

Stock returns, especially returns on small stock, are on average higher in January than in other months (Haugen and Lakonishok, 1988). Monday returns are on average lower than returns on other days (Cross, 1973; French, 1980; Gibbons & Hess, 1981). Returns are on average higher than the day before a holiday and the first half-of-the-calendar month (Ariel, 1987; Lakonishok and Smidt, 1988). In addition, returns are on average higher than turn-of-the-calendar month (Ariel, 1987; Lakonishok and Smidt, 1988) and first third of the calendar month (Kohers and Patel, 1999). However, there are contradictory findings as regards the month-of-the-year and day-of-the-week effects in stock markets of emerging and developing countries (Gao and Kling, 2005). It is not clear in the context of Nepal that whether these anomalous calendar effects on returns prevail in the stock market.

In case of developing countries like Nepal, the notion of an efficient capital market is crucial for some reasons, structural as well as institutional in character. These are: (1) in developing economies capital markets have difficulty in detecting and discriminating among investment opportunities, (2) a dichotomy exists in the financial activities between organized and unorganized money markets, (3) the capital markets are perhaps fragmented, (4) temporal horizons are short, (5) preference continues to be given to investments in physical assets rather than in financial assets. Further, there are many potential and realized imperfections within even the most researched and regulated stock exchanges and much of the empirical research has oriented to measuring the effect that the inefficiencies have on share prices. Some of the inefficiencies may exist in the form of (1) transaction costs, (2) information that is not freely available, (3) disinterested shareholders, (4) earnings retention used for financing, (5) investors' ignorance, and (6) mob speculation (Gupta, 1985). In the context of Nepal, if any or all of these factors are operative in the stock market, share prices are likely to be temporally dependent and predictive.

The need for efficient stock market has, thus, become greater in recent years to mobilize the capital from unproductive to productive sectors of economy. The EMH ensures the allocation of resources in an efficient manner and signals to attract capital, domestic as well as foreign, to fulfill the growing demand of funds in the development of the country. Viewed in this perspective, the present study constitutes a modest attempt in that direction.

1.2 Statement of the problem

Study of the stock market efficiency has long been dominated by the notion that market adjusts available information in a rapid and quick manner (Fama, 1991). The adjustment of available information, public as well as private, would imply that even investors with precise inside information will be unable to beat the market. Accordingly, three types of efficiency came into existence namely: weak, semi-strong and strong. Weak form efficiency takes place when all information embodied in the past prices is reflected in current prices. Semi-strong form efficiency ensures that market exploits all publicly available information and strong-form efficiency implies that investors would not be permitted to earn abnormal profits on the basis of inside information. Based on these approaches of efficiencies, this study attempts to deal with semi-strong form and weak form efficiencies in the context of Nepalese stock market, but does not deal with strong form EMH.

The semi-strong form hypothesis has been tested extensively in terms of the reaction of securities prices to various types of information. Many studies on semi-strong form efficiency of stock market are focused on the information content of the annual earnings and dividend announcements. The purpose of these public disclosure announcements is to provide information that meet investors' needs for decision making. A major difficulty in assessing dividend information content lies in the fact that dividend and earnings announcements often are closely synchronized (Aharony and Swary, 1981). Besides dividend, event studies test also documented the stock price reaction to other releases of information like stock dividends and splits announcements, rights announcements, earnings announcements, mergers and acquisitions and the like. Fama *et al*. (1969) conducted the first study using the event study methodology to examine the reaction of stock prices over the split announcements. The study supported the conclusion that stock market is efficient enough to capture the new information. Other contributors in this regard are Grinblatt *et al*. (1984), Muscarella and Vetsupens (1986), and Dhatt *et al*. (1994). However, Ohlson and Penman (1985), and Brennan *et al*. (1988) did not support the information content of stock dividend and split announcements. Likewise, some evidences of rights announcement effect were documented in Smith (1977), Marsh (1979), White and Lusztig (1980), Dann and Mikkelson (1984), Isa and Tan (1996) and Kabir and Roosenboom (2001). Despite weak evidences in some markets, the studies did support the semi-strong form EMH in the respective markets. It is, however, not clear in the context of Nepal that how speedily the market reacted to such events like dividend and earnings announcements. Within the context of event study model, the present study makes an attempt to evaluate reaction by stock market to the announcement of dividends by Nepalese enterprises.

Theoretically, in an ideal world dividend announcement has no impact on shareholders' value (Miller and Modigliani, 1961). It is important, however, because of its information content and tax effect. The studies on the reaction of stock prices on dividend announcements showed mixed evidences. Some studies supported that it has positive impact on stock prices (such as Kato and Lowenstein (1995), Stevens and Jose (1989)) while others provided the negative relationship mainly due to the tax effect (Loughlin (1989), Easton and Sinclair (1989)). Further, the dividend announcement is an alternative signaling mechanism that also informs investors about the future profitability of their investments. Moreover, studies have been made to examine the reaction of securities prices to dividend information releases. For example, Asquith and Mullins (1983), Brickley (1983), and Dielman and Oppenheimer (1984) showed statistically significant abnormal returns in the (-1, 0) announcement period. Firms that increase dividends or announce special or extra dividends or initiated dividends for the first time experienced positive abnormal returns. On the other hand, firms that decreased or omitted dividend payments realized significant negative returns. However, such evidences are not available in the context of Nepal and no test has been performed on EMH in its semi-strong form by examining the 'cash dividend announcement' as an event of the study.

Random walk properties of stock prices have long been a prominent topic in the study of stock market efficiency in its weak form. The information contained in the past prices is fully and instantaneously incorporated in weak form of EMH and hence stock returns will display unpredictable behavior. In stock prices not characterized by a random walk, the return generating process is dominated by a temporary component and therefore future returns can be predicted by the historical sequence of returns. The early studies conducted by Fama (1970) generally provide evidences in support of the EMH. However, some studies report evidence of predictability of returns on market indices and portfolios. For example, Fama and French (1988) report negative serial correlation in market returns over observation intervals of three to five years and Lo and MacKinlay (1988) report positive serial correlation in weekly returns. While these evidences of stock return predictability reported by Fama and French and Lo and MacKinlay are statistically significant, it is not clear whether these results suggest economically important deviations from the random walk model for stock prices in the context of Nepal.

In the case of individual securities, statistical evidence against the random walk model for stock prices has been documented, but the extent of predictability of returns is generally considered economically insignificant. For instance, French and Roll (1986) report significant negative correlation in daily returns but suggest that it is 'small in absolute magnitude' and that 'it is hard to gauge their economic significance'. Similarly, Lo and MacKinlay (1988) consider weekly holding period returns for individual securities and report that the serial correlation is both statistically and economically insignificant and suggest that the 'idiosyncratic noise ….makes it difficult to detect the presence of predictable component'. Moreover, DeBondt and Thaler (1987), and Lakoishok *et al*. (1994) stated a negative relation between long horizon returns and past financial performance measures such as earnings or sales growth. This implies that one or more short-horizon long-lag regression coefficients must be negative. In contrast, Chan *et al*. (1996) did not reject the null of such a negative relation. Also, La Porta *et al*. (1997) observed large positive returns for value stocks on earnings announcement dates and negative for growth stocks. Thus, in a study of EMH one frequently occurring problem is to delineate the statistical as well as economic significance of return generating process at different intervals (lags) which has been accomplished in this study in the context of Nepal.

In addition to aforementioned stock price behavior, the EMH has been challenged in many studies by detecting calendar anomalies. The calendar anomalies (or seasonalities) are the observance of significantly different share market returns at distinct cusps in time such as on select days-of-the-week, periods of the month, or month-of-the-year. In January or turn-of-the-year effect, stock returns are found to decline in December of each year, with increases in the following January. This effect was originally documented in studies by Branch (1977), Dyl (1977), Keim (1983), Reinganum (1983), and Roll (1983). Two prime reasons have been offered for the January effect: (i) tax-loss selling; and (ii) a small-firm premium that is concentrated in January. In other words, the effect is attributed to small stocks rebounding following the year-end and tax-related selling, where individual stocks performing poorly at year-end are likely to be sold to lock in capital tax losses, to be offset against other income. While the January effect is observed in many countries, some countries such as the United Kingdom, New Zealand and Hong Kong (Agrawal and Tandon, 1994) and Australia (Brown *et al*., 1983) have months other than December as the tax year-end. Hence, it has been argued that the tax-loss selling explanation cannot be the sole determinant of the January effect. However, the January effect is mainly located in small stocks in particular and there appears to be an interaction between small-firm premium and the January effect. Some studies have argued that some of the other calendar anomalies play an important role in the manifestation of the January effect. For example, half of the small-firm premiums in January returns occur in the first few days of January (Keim, 1983), while the day-of-the-week effect has been observed to occur primarily or entirely during the month of January (Rogalski, 1984). Furthermore, it has been argued that the January effect may have more recently moved into November and December. This has been attributed to the requirement that mutual funds report their holdings at the end of October, and from investors buying in anticipation of gains in January. It has led to the notion that the January effect may have moderated or relocated to the other months of the year in recent periods. Nevertheless, January has historically been the best month for stocks across all markets. A few countries have returns in January that are greater than the average return for the whole year (Agrawal and Tandon, 1994). In general, this tends to be large and positive in most countries (Gultekin and

Gultekin, 1983). In the context of Nepal, it has become difficult to support one view or another for the explanation of January anomaly as this is neither a first calendar month nor first month of the fiscal year. This investigation is, however, not only limited to the study of the January effect, it has also been extended to the month-of-the-year effect and size effect on calendar month of the year.

A number of studies have extensively investigated the presence of the day-of-the-week effect for stock returns. For example, Cross (1973) examines the day-of-the-week effect for the S&P 500 stock index over the period of 1953 to 1970 and observed that the mean return on Monday is lower than that of Friday. French (1980) also documented the unusual stock returns over weekends for the same market but for a substantially longer period. Likewise, a large number of studies showed that the average return on Monday, in the mean equation, is significantly less than the average return of other days of the week. Jaffe and Westerfield (1985) and Keim and Stambaugh (1984) claim that this anomalous empirical finding is one of the most puzzling phenomena in finance. Jacops and Levy (1988) try to explain based on human nature in combination with the tendency to announce good news quickly and to defer bad news. For example, bad news may be released after markets close so as to allow the market to absorb the shock over the weekend. Thus, the impact of bad news is represented on Monday's returns. This statement is also supported by Damodaran (1989). Wang *et al*. (1997) reinforced the evidence of a Monday effect but only for the last two weeks of the month for the period from 1962 to 1993. This evidence was not only documented in US stock markets, but also in other stock markets. For example, Aggrarwal and Rivoli (1989), Wong *et al*. (1992), Chang *et al*. (1993), and Choudhry (2000) provide evidence of calendar anomalies in emerging Asian stock markets. Alexakis and Xanthakis (1995) studied the Greek stock market, providing evidence that Tuesday renders negative returns for the period before 1988. From 1989 onwards the Greek stock market showed negative returns for Monday. Furthermore, Chang *et al*. (1993), Dubois (1986), Jaffe and Westerfield (1985), Bhattacharya *et al*. (2003), among others, show that the distribution of stock returns varies by day of the week. In the context of Nepal, it is important to investigate whether the investors can beat the market by observing the stock price behavior of a particular day-of-the-week.

The efficiency or inefficiency of the stock market also depends upon the development of regulatory institutions, awareness of investors, effective enforcement of rules and regulations, market discipline, corporate good governance, instantaneous flow of information and the likes. These qualitative issues need to be addressed while making overall evaluation of market efficiency. There are few studies conducted to understand the behavior of investors. For example, Lewellen *et al*. (1977), Baker *et al*. (1977) and Shiller (1990) conducted studies on investment goals, behavior and beliefs of investors as well as their opinion on predictability of returns. Though there are these studies and findings in the context of developed and big markets, their applicability is yet to be seen in the context of smaller and under developed stock markets like that of Nepal.

The accelerating pace of development of capital market in Nepal has opened the avenues for utilization of funds for corporate sectors. It is well accepted a fact that Nepal has abundant resources, both human and natural, to exploit, but at the same it is facing inadequacy of financial resources. As the resource mobilization domestically as well as internationally is crucial for Nepal to speed up its economic development, it is essential that the stock market be efficient. This study, therefore, attempts to indicate, among others, to improve the level of efficiency of the stock market in Nepal. To sum, this study deals with the following issues:

- How efficient is the stock market in Nepal? Is the Nepalese stock market a 'semi-strong form efficient'? If the market is not efficient in semi-strong form, is it weak form efficient?

- Do stock prices adjust publicly available information quickly? Do investors receive normal returns from their investments when the news becomes public or there is a chance of speculative return?

- Whether the stock market efficiency improved after the effective implementation of capital gains tax in Nepal?

- What is the speed of reaction by stock prices over the information on size of dividend payout ratio?

- Whether the prices in Nepalese stock market show any systematic patterns or are they indistinguishable from those of random walks? How far it deviates from idealized EMH?

- Do stock prices over the short periods, such as a day, week or month display random phenomenon? Whether the successive prices are uncorrelated of one another?
- What is the nature of stock returns distribution in Nepal? Do these conform to the idealized normal distribution?
- Do the charts of market transactions detect shifts in supply and demand? Can valuable information be received from reading charts of past price movements?
- Are the investors able to earn excess return on particular month-of-the-year or day-of-the-week? Is it possible to earn such excess profits by constructing portfolio of stocks? Is there any impact of size of the portfolios?
- How is the market efficiency perceived by the Nepalese investors and enterprises?

1.3 Objectives of the study

The major objective of this study is to examine the level of market efficiency in Nepal. The specific objectives of the study are as follows:

- To analyze the stock price reaction over the public announcement of cash dividends by Nepalese companies in order to measure the semi-strong form efficiency,
- To assess the randomness of returns on stock market in order to identify whether successive price changes are independent of each other,
- To examine calendar effects such as month-of-the-year and day-of-the-week effects in stock prices,
- To analyze the size effect on calendar months' and day-of-the-week returns,
- To evaluate the overall efficiency of the stock market in Nepal by conducting a survey of investors and executives of Nepalese companies.

1.4 Hypotheses

In order to achieve the above objectives, this study attempts to test the following hypotheses related to the stock market efficiency in Nepal.

- Stock market in Nepal is semi-strong form efficient. In other words, the investors do not realize abnormal returns due the public announcement of dividends by the companies.
- Stock market in Nepal is weak form efficient. In other words, there is no autocorrelation between the historical prices and index data. The observed and expected number of runs of prices and indexes do not differ significantly.
- Stock prices are not affected by the month-of-the-year and day-of-the week. There is no size-effect in the calendar months of the year and day-of-the-week.
- There is no association between motivation, choice of market, number of shares to buy in primary and secondary market, consulting place, order efficiency, reaction over the news, risk management techniques and shareholders awareness; and occupation (and qualification) of investors.
- There is no association between share listing, public issue management, regulatory effectiveness, market efficiency; and the type of institution.

1.5 The research design and methodology

The methodology includes research design, nature and sources of data, selection of enterprises and methods of analysis of the study.

(a) Research design

The research design adopted in this study consists of descriptive, correlation and causal comparative research designs to deal with the various issues raised in this study. The descriptive research design has been adopted to undertake fact-finding operation searching for adequate information in the context of efficiency in Nepalese stock market and to assess the opinions and characteristics of investors and the executives of the listed companies in Nepal. An attempt has also been made to describe the situation and events occurring during the period of study in the context of Nepalese stock market. This study has also adopted correlation research design to establish the directions, magnitudes and forms of the observed relationship between current stock price and prices at one or more period earlier. Moreover, this study has also adopted causal comparative research design to determine the effect of calendar month of the year, day-of-the-week and size of the portfolio of stocks on stock market returns. This design has also been used to understand the fact that whether it is possible to predict the future prices on the basis of the historical price information. The detailed methodological issues are discussed extensively in respective sections of this study.

(b) Nature and sources of data

This study has utilized both the primary and secondary sources of data. The semi-strong-form, weak-form market efficiency and calendar effects are tested by utilizing the secondary sources of data. The overall efficiency of the stock market in Nepal has been evaluated using primary source of data.

The secondary source primarily includes annual reports of Nepal Stock Exchange Limited from fiscal year 1995/96 through 2004/05. Prices of individual companies have been collected from the files of Nepal Stock Exchange Limited. Annual reports of the individual companies have also been collected to obtain the information regarding dividend, bonus shares, right issues and other types of corporate events. In order to address the semi-strong form efficiency with the announcement effect of cash dividend, the Board of Director's (BOD) decision date is crucial and this has been obtained from the official records of the listed companies for the study purpose.

The semi-strong form of EMH has been tested by utilizing the 28 observations (cases) of cash dividend announcements by listed enterprises. The data includes the 12 cases of pre-2001 dividend announcements and 16 cases of post-2001 dividend announcements. In August 2001, the Government of Nepal had implemented the capital gains tax rate in stock transactions. From the dividend payout ratio point of view, large dividend payout ratio (more than 20 percent) and small dividend payout ratio include each of 14 cases. Similarly, the weak form efficiency and calendar effects on the Nepalese stock market have been tested by utilizing the Nepal Stock Exchange (NEPSE) index data and closing prices of 30 enterprises. It includes 2344 observations of daily market returns, 508 observations of weekly market returns and 120 observations of monthly market returns. Similarly, returns on individual enterprises for daily, weekly and monthly intervals are also utilized to test the random walk hypothesis in Nepalese stock market.

The primary data required for this study has been collected through structured questionnaire distributed to the individual investors and executives of listed companies. Data are also collected from Ministry of Finance (Government of Nepal), Nepal Rastra Bank, National Planning Commission and publications of media houses, Gorkahpatra Sansthan and Kantipur Publications.

The well-structured questionnaires were sent to the investors in share market and executives of listed companies to gather the information regarding the various issues of EMH in Nepal. As regards the respondents from investors, 78.2 percent are from Kathmandu, 85.3 percent are practitioners, 87.2 percent are males, more than 50 percent are post graduate and 58 percent are above 35 years. On the other hand, the respondents from the listed companies include 12 commercial banks, five development banks, 42 finance companies, three hotels, 11 insurance companies, six manufacturing companies and four others constituting a total of 83 companies (66 percent) out of 125 listed companies. Further, the respondents from listed companies included are 71.1 percent depository institutions (banks and financial institutions) and 28.9 percent are non-depository institutions.

(c) Selection of enterprises

The market reaction to cash dividend by the stock market has been studied by utilizing the dividend announcement of 21 enterprises those are listed in the Nepal Stock Exchange Limited. The samples are selected from listed enterprises which announced and distributed cash dividends during the 10 years period from 1996 to 2005. This study has excluded the announcements of cash dividends contaminated by other concurrent firm specific events such as earnings announcements, rights announcements and others during the event window. The samples selected include 11 finance companies, eight commercial banks, one insurance company and one manufacturing company.

The only index data that is utilized to test RWH is the NEPSE index available for the purpose of the study. However, this study has also utilized the prices of 30 listed enterprises in Nepal Stock Exchange. While selecting the enterprises, factors like market capitalization, volume of transactions, frequency of trading, tenure of the enterprise and the like, has been taken into consideration. Accordingly, eight commercial banks, three manufacturing and processing companies, two hotels, one trading company, six insurance companies and ten finance companies are selected to confirm the results of the index data. Out of the 30 enterprises, the beginning period of the data of 22 enterprises is 1995. The beginning period of the data of remaining enterprises ranges from 1996 to 1999. However, the ending period of data of each enterprise is 2005.

The index data and closing prices of 30 enterprises are also utilized to investigate the size effects on calendar month-of-the-year and day-of-the-week stock returns. The 30 enterprises are grouped into five different portfolios based on the size (market capitalization) of the enterprises. Each portfolio consists of six enterprises. The lowest portfolio (portfolio one) is small size portfolio and highest portfolio (portfolio five) is a large size portfolio.

(d) Method of analysis

The model

The event-study methodology has been applied to test the reaction of the market to the announcement of cash dividend. According to this methodology, the stock market is said to be efficient in semi-strong form if the investor does not gain abnormal return during the specified period called 'event window period'. The abnormal return is the difference between actual return and expected return. For the purpose of this study, market model has been utilized to calculate the expected return. The market model is expressed as:

$$E(R_{it}) = f(R_{mt})$$

After estimating the expected return for the event window period, the abnormal return has been computed by taking the difference between actual (realized) return and expected return for each enterprise.

Thus, $AR_t = R_t - E(R_t)$

Finally, the average abnormal return (AAR) and cumulative average abnormal returns (CAAR) have been computed for the event window period by taking into account of the abnormal returns on selected enterprises.

Hence, $AAR_t = \frac{\sum AAR_t}{n}$, and

$$CAAR_t = \sum_{t=2}^{t=1} AAR_t$$

The semi-strong form of EMH is, thus, tested against the null of zero average abnormal return and cumulative average abnormal return.

Auto-correlation and runs test have been used to test the random walk hypothesis, a measure of weak-form efficient market. The market is said to weak-form efficient if current prices (or returns) are independent of the past prices (or return). In other words, there should be no autocorrelation between the price (or return) at 't' period and 't-τ' period earlier. The model is, thus, expressed as:

$$P_t = f(P_{t-\tau})$$

The RWH has been tested against the null of zero autocorrelation of returns and equal expected and observed number of runs. Besides, descriptive statistics such as mean, standard deviation, skewness, kurtosis and Jarque-Bera (JB) test and Kolomogorov-Smirnov (K-S) test for examining the distribution character of the stock market returns and stock returns are also conducted in the study.

Regression with days, month and size dummies has been used in assessing the calendar effect in stock prices. The month-of-the-year effect has been examined using the following model:

$$R_{it} = f(January, February, \ldots\ldots, December)$$

Similarly, the day-of-the-week effect has been assessed with the following model:

$$R_{it} = f(Sunday, Monday......Friday)$$

Moreover, the size-effect in the calendar months and day-of-the-week has been examined with the following model:

$$R_{month/day} = f(porfolio_1,.......portfolio_5)$$

The mean return for each month-of-the-year and day-of-the-week has been tested against the null of zero mean and the joint significance of the coefficients of each month and day dummies have been tested against the null of zero to confirm the equality of returns across the calendar month of the year and day of the week.

Primary data analysis

The primary data collected from 156 investors and 83 listed enterprises have been tabulated and analyzed, and significance tests have been performed using chi-square and ANOVA where relevant.

1.6 Limitations of the study

The limitations of the study are as follows:

- Though this study aims at testing the efficiency of the stock market, all types and dimensions of efficiency have not been tested in the context of Nepal. This study is only confined to the test of semi-strong form and weak form of EMH. Thus, strong-form of EMH has not been dealt in this study. Most studies on strong-form test require insiders' information and mutual funds data. Due to lack of the relevant database on these individuals and institutions, this study does not cover strong-form efficiency test in the context of Nepalese stock market.

- On testing semi-strong form hypothesis of EMH, this study is limited to use only one event, i.e. cash dividend announcement by the listed enterprises. Thus, this study has excluded the events like stock dividend announcements, rights announcements, earnings announcements and new public issue announcements by the listed enterprises. It is common practice in Nepal that listed firms announce cash dividends along with stock dividends, rights announcements and even the new issues announcements at the same time. A correct use of event study methodology suggests those announcements to be excluded which are contaminated by concurrent firm specific events.

- In order to make a study on EMH more fruitful, it is essential that price sensitive decisions by the Board of Directors' (BOD) of the listed enterprises be published and disseminated immediately through media or other sources. Here again, such information could not be obtained and due to this the study has been forced to use the data which are provided by the enterprises from their official records.

- This study is limited to testing the independence hypothesis of the random walk model by using such statistical techniques as autocorrelation and runs test. As such, it does not attempt to go into the details of distribution hypothesis of share price changes and build a predictive model. From an economic point of view, it is the hypothesis of independence of price changes which is considered to be important and meaningful because of its implication for stock market efficiency. Thus, the study is confined to testing the weak form efficient market hypothesis.

- It may also be noted that in this study no attempt has been made to investigate price behavior of preference shares for non-existence of adequate price data. In addition, tests based on filter rules have also not been conducted here, as this investigation is not aimed at testing any specific mechanical trading techniques.

- This study has assumed the linear relationship between the current and historical prices of stocks and index data, focusing on the Fama's (1965) model. Hence, linear models are used in testing the weak form efficient market hypothesis. Thus this study has not considered the 'non-linearity' and 'thin trading' biases those are normally characterized in stock markets of emerging countries. Moreover, the auto correlated and variance errors are not considered in this study.

- While testing the EMH in Nepalese stock market, this study has used market value weighted Nepal Stock Exchange (NEPSE) Index. The weighting scheme of an index may affect the results of empirical studies. Analysis performed with the data that uses equal weights indicate statistically significant seasonality in US capital markets (Rozeff and Kinney, 1976). Equal weighting schemes place a greater weight on small firms than a market weighted approach. On the other hand, value weighted index do not put any bias towards small stocks that could magnify any potential seasonality effects. However, in the context of Nepal this study has confined to utilize only one index as there were not any other indexes developed as a benchmark for stock market indicator in Nepal.

- The study period includes daily, weekly and monthly observations of index and price data from 1995-2005. Nepal Stock Exchange opened its trading floor on 13th January 1994. The data before 15th July, 1995 have not been considered because in the initial trading days the pricing may not be fair. For the purpose of the study, the data collection period was 2006, so the latest data that has been collected till July 2005. However, the primary data has been collected during 2006-07.

- It is worthwhile to note here that while assessing the random walk hypothesis of share prices, the two tests- autocorrelation and runs test-led to different conclusions in some cases. Such disagreement may arise for two reasons. Firstly, the parametric test, i.e. autocorrelation test only claims to investigate whether or not the price changes are linearly correlated. Secondly, the non-parametric test, i.e., the runs test helps to detect if the price changes follow some trend, not necessarily linear.

- This study has also used the daily, weekly and monthly prices of listed enterprises to test the RWH in Nepalese stock market. Many of the companies' shares are not traded in the NEPSE and hence excluded from the sample. Some companies' shares which are traded in the NEPSE also excluded because of infrequent trading such as once in a month or some once in two or three months. Some companies are also excluded because these companies have not prepared their financial statements nor got their books of accounts audited for a long time. Most frequently traded shares in the stock exchange are of banks and finance companies; hence these are included in large numbers. Many companies those listed after 1995 are also excluded for the purpose of this study.

- This study has used the closing price of the shares as representative price for the period. Though there are studies using different prices such as bid price, ask price, average of bid and ask price, transaction price and even high frequency prices (such as hourly prices), most of the studies use closing price as the representative price (Taylor, 2005). Moreover, in the context of Nepal prices other than closing price are not available in a chronological order and not published for the use of general public.

- The survey for the investors has been conducted only in the Kathmandu valley. The major reasons for this selection are: the mostly centered share market activity is in the capital; and the only exchange, Nepal Stock Exchange, that exists in Kathmandu. Further, the head office of the most of the listed enterprises and offices of the brokers are incorporated in Kathmandu valley. Hence the study is confined to limit the survey within Kathmandu valley.

1.7 Organization of the study

This study is divided into six chapters. Chapter I is an introductory chapter that describes the statement of the problem, objectives of the study, research methodology, hypotheses and limitations of the study. Chapter II deals with reaction of the stock prices to the announcement of cash dividend. The chapter provides a survey of event study tests followed by data set and testing methodology along with results of analyzing the data. The random walk efficient market hypothesis has been presented in chapter III. The extensive review of random walk test along with the model, data and empirical analysis are discussed in this chapter. Chapter IV deals with calendar effects on stock prices. This chapter provides detailed survey of calendar anomalies in financial literature followed by data and research methods, analysis of the month-of-the-year and day-of-the-week effects. The overall efficiency in the stock market in Nepal has been evaluated in chapter V. The chapter provides survey results of investors and executives of listed companies. Chapter VI summarizes the study with major findings and implications of empirical results. The chapter also provides conclusion of the study and make major recommendations.

Chapter II

STOCK MARKET REACTION TO DIVIDEND ANNOUNCEMENT

It is widely believed that financial markets adjust rapidly to releases of firm specific information. Much of the studies in finance are concerned with identifying the relation between stock returns and economic events (Fama *et al*. (1969), Pettit (1972), Aharony and Swary (1980)). Meaningful interpretation of these 'event studies' presupposes the efficiency of the stock market. If prices do not react quickly and unbiasedly to relevant information, little economic insight can be gained from observing stock returns around the announcement of various financial or economic events.

In defining the term 'relevant information' in a manner that allows testing of market efficiency, a delineation of three increasingly broad information sets has become widely accepted. The narrowest of these are known as weak form tests of market efficiency which includes all information implied by the historical sequence of prices. For semi-strong form tests, the information set is broadened to include all publicly available information. Strong form tests are with respect to all publicly and privately available information.

2.1 Introduction

The semi-strong form of efficient market hypothesis (EMH) states that security prices will always reflect publicly available information. In other words, information, such as the announcement of dividends, will be immediately impounded in the firm's security prices. Therefore, it would be impossible for an investor to earn a portfolio return based on this publicly available information in excess of the return which is commensurate with the portfolio risk.

Tests of the semi-strong form of the EMH have studied the reaction of security prices to various types of information around the announcement time of that information. If the announcement had some economic significance, then there should be some reaction. However, the EMH would predict that this reaction would occur prior to or almost immediately upon the public announcement. Since the information may be learned by the investment community from alternative information sources prior to its public announcement, the existence of a price reaction prior to public announcement would not be unusual.

Furthermore, a reaction immediately upon the announcement date could be caused by any additional information not anticipated by or disclosed to market participants. However, the semi-strong form of the EMH would predict that there could be a sharp price change on the announcement of new information, but no discernible price reaction following the announcement, because the market participant would adjust market prices immediately (or nearly so) and in an unbiased manner, thereby removing any possibility for future abnormal returns.

A great deal of theoretical and empirical studies on dividend effects has been conducted over the last several decades. Theoretically, cash dividends means giving rewards to the shareholders that is something they already own in the company, hence this will be offset by the decline in the stock value (Porterfield, 1959 and 1965). In an ideal world (without tax and any restrictions), therefore, dividend payments would have no impact on shareholder's value (Miller and Modigliani, 1961). In the real world, however, a change in dividend policy is often followed by change in market value of stocks. The economic argument for investors' preference to dividend income was offered by Graham-Dodd (1951). Subsequently, Walter (1956) and Gordon (1959 and 1962) forwarded the dividend relevancy idea, which has been formalized into a theory, postulating that current stock price would reflect the present value of all expected dividend payments in the future.

Other studies made efforts to further understand the dividend controversy. Among them Brennan (1970), and Litzenberger and Ramaswamy (1979 and 1980) showed that it is not optimal for the investors to receive dividends if their marginal tax rate is greater than zero, and investors' after tax expected rate of return (discount rate) depends on the dividend yield and systematic risk. This leads to an idea that at least dividend might have some tax-induced effect on the share prices. Average investors, subject to their personal tax rates, would prefer to have less cash dividend if it is taxable: size of optimal dividend inversely related to personal income tax rates (Pye, 1972). Hence, stocks prices tend to decline after announcement of dividend increase.

Empirical studies, however, showed mixed evidence, using data from US and other developed stock markets. A number of studies revealed that stock price has a significant positive relationship with the dividend payment (for example, Gordon (1959), Ogden (1994), Stevens and Jose (1989), Kato and Loewenstein (1995), Ariff and Finn (1986), and Lee (1995)), while others found a negative relationship (Loughlin (1989) and Easton and Sinclair (1989)). A negative relationship between dividend announcement and stock return is expected due to tax effect, but studies tended to relate the positive relationship between the stocks return and dividend announcement with the information effect of dividend. The dividend information hypothesis postulates that cash dividend carries information regarding the future cash flows of the firm that is to be reflected in the market price of stock after announcement of dividend, particularly when dividend increases (Bhattacharya (1979), Bar-Yosef and Huffman (1986) and Yoon and Starks (1995)).

The EMH, as it is popularly called, has been tested extensively in all its forms and as far as developed and developing capital markets are concerned during the past three decades or so. There are some studies that examined the weak and semi strong level of efficiency in Indian markets as well. As far as Nepalese stock market is concerned, no studies have been conducted to examine the efficiency of the market at any level.

The purpose of this chapter will be to test the efficiency of Nepalese stock market in semi-strong form. The event of the study is cash dividend announcement by Nepalese listed companies. The analysis proceeds as follows: Section 2.2 outlines previous research into stock market reaction to announcements like dividends, earnings, stock split, rights and the like. Section 2.3 describes data set and testing methodology. The results are presented in section 2.4. Finally, section 2.5 provides a discussion over the results.

2.2 A survey of event study tests

The semi-strong form efficiency requires that stock prices reflect all publicly available information. It is concerned with the speed of adjustment of prices to new information. However, it is not possible to test this version of efficiency for all types of publicly available information. In general, studies have focused on accounting information to test semi-strong form efficiency of the stock markets.

There have been numerous studies carried out to test the stock markets response to the public releases of information. Most studies have found that the particular share market studied was efficient with respect to the information release. These studies are test of a joint hypothesis firstly that the market is efficient with respect to the information being released, and secondly, that the methodology used in the test is correct.

Most tests of semi-strong EMH compare the actual security returns observed around the event date (the date when the information first became publicly available) with the expected or normal returns if there had been no events and draw inferences about semi-strong form efficiency.

(a) Market reaction to dividend announcements

Most firms that pay dividends exhibit behavior that results in constant dividend payouts. The dividends are increased only when management is relatively certain that the higher dividend payout can be maintained indefinitely. Given this type of management behavior, it is likely that investors will interpret an increase in current dividend payout as a message that management anticipates permanently higher levels of cash flows from investment. It is, therefore, expected to observe an increase in share prices associated with public announcement of dividend increase. The dividend per se does not affect the value of the firm. Instead, it serves as a message from management that the firm is anticipated to do better. If dividends are to have an impact on share values, it is necessary that they convey information about future cash flows but it is not sufficient. The same information may be provided to investors via other sources.

Therefore, it becomes an empirical question whether or not announcement of dividend changes actually affect share value.

In a well-functioning market, on average, there should be no surprise in dividend announcements. Absent microstructure effects, market efficiency indicates that the excess returns to all dividend announcements, taken together, be zero (Bajaj and Vijh, 1995). A number of empirical studies have examined whether dividends contain information. Pettit (1972) showed that dividend announcements do convey valuable information. However, Watts (1973) and Gonedes (1978) came to the opposite conclusion. The studies contended that unexpected dividend changes communicate no information beyond that reflected in other contemporaneous variables (e.g. earnings). Laub (1976) and Pettit (1976) challenged Watts's findings, and Watts (1976) rebutted these challenges.

Pettit (1972) urged conveyance of information through dividend announcements was that reported earnings might not be an accurate reflection of real earnings. It was claimed that the reported earnings are subject to random nonrecurring factors that cannot be specifically and exactly identified by the investing public. Since management may have greater insight than the rest of the market as to the level of present and future earning power, they may use dividend payments as the medium through which their expectations are conveyed. In the study, Pettit (1972) cross-classified firms according to the estimated dividend and earnings information conveyed to the market. Earnings information was classified into two groups (positive and negative) according to whether actual reported quarterly earnings exceeded or fell short of expected earnings. Expected earnings were from estimates of the relationship that exists between the firms' (growth adjusted) earnings and market earnings. Dividend classes were made up of: omissions, reductions, no changes, less than 10 percent increases, 10 to less than 25 percent increases, 25 percent increases and greater, and initial payments. The intent was to provide reasonably homogeneous dividend information groups as a basis for testing the hypothesis that dividends convey information. For each of these earnings-dividends classes, an abnormal performance index was calculated using the market model.

The conclusion that a significant level of new information was being conveyed by dividend announcements was based on two findings. First, the performance indices were highest for the initial dividend payment group and declined as dividend performance became worse within the earnings classes. Second, for all but the 'no changes' group, the dividend announcement seemed to dominate the earnings announcement. That is, when dividends were changed, the impact of earnings announcements was observed negligible.

The results of the study, however, have been criticized because it used the observed dividend changes rather than the unexpected dividend changes. Kwan (1981) has improved on the design of the study by forming portfolios based on unexpected dividend changes. The study concluded with the statistically significant abnormal returns when firm announce unexpectedly large dividend changes.

A significant stream of earlier studies in the United States has empirically documented that unexpected increases (decreases) in regular cash dividends generally elicit a significantly positive (negative) stock market reaction (see, for example, Fama *et al*. (1969) and Pettit (1972)). Moreover, this finding persists even after controlling for contemporaneous earnings announcements (Aharony and Swary (1980)). In the same vein, Asquith and Mullins (1983) reported that, like dividend increases dividend initiations have a significant positive impact on shareholders wealth.

Much subsequent studies have focused on explaining the dividend-increase induced positive stock market reaction. The predominant explanation, by far, has been the information-signaling hypothesis. Since managers have information that outside investors do not have, dividend policy is costly-to-replicate vehicle for conveying positive private information to market participants. In line with these arguments, signaling models by Bhattacharya (1979) and Miller and Rock (1985), among others, find that dividend increases convey information about the firm's current and future cash flows. In addition to supportive event study results, empirical studies by Ofer and Siegel (1987) and Healy and Palepu (1988) examined changes in dividend policy in relation to future earnings and related analysts' forecasts, also consistent with information signaling hypothesis. Benartzi *et al*. (1997) find that earnings are less likely to drop after a dividend increase; however, the studies did not reveal that dividend increases are followed by unexpected earnings increases. The evidence is only weakly consistent with an informational-signaling hypothesis. DeAngelo *et al*. (1992) observed that a loss is a necessary but not a sufficient condition for a dividend cut, and that dividend cuts improve the ability of earnings to predict future earnings. Moreover, DeAngelo *et al*. (1992), Benartzi *et al*. (1997), and Jensen and Johnson (1995) documented that the dividend cuts are followed by earnings increases, consistent with dividend cuts making the end of firm's financial decline and beginning of its restructuring. In sum, the evidences by prior research on the signaling value of dividend changes have been mixed.

An alternative explanation for changes in corporate dividend policy stems from agency theory. Jensen (1986) suggests that managers, motivated by compensation and human capital considerations, have incentives to over invest free cash flows even in the absence of profitable growth opportunities (the free cash flow hypothesis). Dividend payout policy in this case becomes a vehicle for monitoring managers' potential to misuse excess funds. Thus, the observed positive stock market reaction following dividend increases is consistent, in addition to information signaling, with a reduction in agency costs.

Lang and Litzenberger (1989) attempted to disentangle between signaling and agency explanations by separating firms those are presumably over investing (with q-ratios less than one) for all other value-maximizing firms. The study revealed higher abnormal returns for over investing firms for which the agency related benefits of a dividend payout increase are higher compared to value-maximizing firms. Consistent with the free cash flow hypothesis, the market reaction to dividend increases by value-maximizing firms, albeit positive, is significantly lower than the market reaction for over investors.

By contrast, Denis *et al*. (1994), after controlling for dividend yield, reported no support for the free cash flow hypothesis for a large sample of dividend changes. Furthermore, Yoon and Starks (1995) did not detect the release of new information about managers' investment policies following a change in dividend policy. The study showed a positive relation between dividend policy changes and capital expenditure changes, interpreting their evidence as being supportive of information signaling over a free cash flow explanation of dividend policy. Also consistent with the free cash flow hypothesis DeAngelo and DeAngelo (2000) evidenced that market penalized Times Mirror for intending to poorly reinvest free cash flow and applauded later dividend redistributions of that cash flow.

In a major international study, La Porta *et al*. (2000) revealed that dividends are paid because minority shareholders pressure corporate insiders to disgorge cash. Additional studies on the relevance of the free cash flow hypothesis for alternative payout methods such as share repurchase and special dividends have provided mixed results (e.g. Howe *et al*. (1992)). Despite mixed overall evidence on the free cash flow hypothesis, most researchers attribute the conflicting results to imperfect empirical constructs rather than theoretical flaws.

A next explanation is the tax hypothesis. Given the differential tax treatment between dividend income and capital gains, dividend policy changes also have tax implications that are reflected in stock market prices. In the United States, capital gains have historically been taxed more favorably than dividends. Capital gains and dividend incomes are also taxed in Nepal. The observed positive stock market reaction of dividend increases for US firms appears to be inconsistent with the unfavorable tax treatment of dividend income. Conceivably, any negative tax effect may be dominated by stronger positive signaling and/or free cash flow effects.

Examination of reaction to dividend changes in markets such as Nepal can be fruitful exercise in that the relative import of alternative explanation of dividend policy may likely differ compared to the developed market. First, the clear implication of the standard free cash flow hypothesis as advanced by Jensen (1986) is the separation of ownership and control since wider ownership dispersion intensifies the conflict of interests between managers and shareholders. This conflict of interests generally motivates higher dividend payouts to limit the managerial tendency to misuse shareholders funds. In Nepal firms are, for the most part, closely held, with ownership concentrated in the form of large equity blocks in the hands of management and family members. This may suggest that managers in Nepal have a disincentive to misuse funds through over-investing since the relative benefit of managing a larger firm is likely to be outweighed by the direct cost of over investing on the manager's substantial personal holdings in the firm. The point is, as ownership becomes more concentrated, the likelihood of over investment is reduced. Further, firm sizes are quite small in Nepal so that the managerial "hubris" of inflating firm size is likely to be negligible.

However, in many of these family businesses there may be conflict of interests between the larger and smaller shareholders. The problem may be more pronounced in many stock markets when lack of transparency, both at the company level and in the stock market, allows alternative forms of exploitation of smaller shareholders by the larger shareholders and management (see, Holderness and Sheehan, 1988). Since monitoring is difficult in such cases, it may be substituted by higher dividends that may serve to mitigate this form of exploitation. Thus, although over investing free cash flow in Nepalese market is likely to be limited due to concentrated corporate ownership structures, other forms of exploitation of smaller shareholders by larger shareholders and management may partly justify dividend increases, in addition, to information signaling reasons. That is, small stockholders purchasing equity against large block holders expect to suffer a certain degree of exploitation. An unexpected increase in cash dividends reduces market's assessment of future exploitation by large block holders, causing an upward revision in the stock price.

An attempt had been made to break up the information signaling of earnings and dividends. Aharony and Swary (1980) separated the information content of quarterly earnings reports from that of unexpected quarterly dividend changes. Accordingly, the study attempted to resolve the empirical issue as to whether quarterly dividend announcements convey useful information beyond that provided by quarterly earnings numbers. The study used a sample of 149 industrial firms listed on the NYSE examining only those quarterly dividends and earnings announcements, which were made public on different dates within any given quarter. This distinguishes earnings announcements that precede or follow from those accompanying dividend announcements.

The results of the study indicate that stockholders of companies that did not changes their dividends, on an average, earned only normal returns (as predicted from the market model) over the twenty days surrounding the announcement dates. The results were similar whether earnings announcement preceded or followed dividend announcements. In case of companies, that announced dividend increases, their stockholders realized, on average, positive abnormal returns over the twenty dates surrounding announcement dates. Finally, stockholders of companies that reduced the dividends sustained, on average, negative abnormal returns during the twenty days surrounding announcement dates. Thus, the study reported that market's reaction to the dividend announcements support the hypothesis that changes in quarterly cash dividends provide useful information beyond that provided by corresponding quarterly earnings numbers. Further, it also supported the semi-strong efficiency of the market in that the market adjusts in an efficient manner to new quarterly dividend information.

On the other hand, Watts (1973) attempted to measure importance of dividends in two separate ways. The first estimated the relation between annual earnings in period 't +1' in the future and annual dividends in 't–1' and 't'. The second attempted to measure the relation between unexpected changes in share price and unexpected changes in annual dividends which are meant to serve as the conveyer of the information. The second is by far the most interesting since unexpected changes in share price incorporate all unexpected changes in future anticipated earnings and not just earnings one period into the future. The study relied heavily on the second test.

In his study, Watts (1973) classified fiscal firm/years into positive and negative dividend categories according to the sign of the difference between actual dividend changes and expected dividend changes. Expected dividend changes for each firm are formed from coefficients estimated for the time series expression,

$$\Delta D_t = D_t - D_{t-1} = \beta_1 D_{t-1} + \beta_2 E_t + \beta_3 E_{t-1} + \varepsilon_t$$

Where D indicates dividends per share, E indicates earnings per share, and ε_t is a time series error term presumed to satisfy the usual requirements of a regression equation. Abnormal security performance values for these two groups were calculated by compounding one plus the difference between actual returns in period ‘t’ and expected returns in period 't', and averaging this value over the number of firms in each group studied. Expected returns were calculated by using the market model. The derivation of conditional expected dividends with the use of equation (1) was designed to hold constant the information conveyed by earnings so that the dividend impact can be separately identified. The findings that no information is conveyed by dividends is, then, based on the absence of any significant difference in abnormal performance index values between the two groups of dividend-paying firms.

Similarly, Charest (1978b) examined the efficiency of NYSE with respect to selected dividend information from the period 1947-67. The study also documented the risk-return behavior of common stocks around dividend changes and investigated the stability of the results. The methodology of the study called for the estimation of the sampled stocks risk adjusted abnormal returns using a two factor market model and the assessment of how a hypothetical trader in dividend changing stocks would have gained had he systematically applied various trading rules and investment strategies. The study reported statistically significant residuals in the months following dividend changes. The NYSE failed, on the average, to adjust fully dividend information within month of news dissemination. Thus, NYSE was found to be inefficient in interpreting selected cash dividend change information in the 1947-67 periods.

Kane *et al*. (1984) also selected a set of firms whose quarterly dividend and earnings announcements are separated by at least 10 days. The study built models to predict expected earnings and dividends, and then tested to see if unexpected dividend and earnings announcements corroborate each other - in other words, is there an interaction effect? The results confirmed the earlier studies that found that both earnings and dividend announcements have a significant effect on share prices. In addition, the study revealed a significant corroboration effect.

A study on the effect of dividend announcements on nonconvertible bonds and nonconvertible preferred stock was conducted by Woolridge (1983) in an attempt to separate expropriation effects from announcement effects. If dividend payouts to shareholders are viewed as payments of collateralizable assets, and if debt covenants are imperfect protection, then debt holders and preferred shareholders would view dividend increases as bad news and market value of their claims on the firm would fall upon the announcement of dividend increases. On the other hand, if dividend increases are signals about higher future cash flows, then bondholders and preferred stockholders should feel more secure and the market value of their claims should increase. The results of the study support the signaling hypothesis (or at least the conclusion that the signaling effect dominates any expropriation effect). Abnormal returns on announcement date are positive given unexpected dividend increases and negative given unexpected dividend decreases.

Brickley (1983) conducted a study on the announcement effect of specially designated dividends - those labeled by management as ‘extra’, ‘special’, or ‘year-end’, and compare them to surrounding regular dividend increases. Specially designated dividends are interesting because they are not intended to be a part of continuing higher dividend payout and may therefore not be interpreted by a market as a signal about higher future cash flows. The results support the opposite conclusion-namely, that the market does react positively to the information content of specially designated dividends but that dollar-for-dollar regular dividends convey information to the market about expected future cash flows.

The adjustment of stock prices in the stock market subsequent to three kinds of corporate announcements viz. a dividend increase, bonus issues, and rights issues using the event methodology analyzed by Rao (1994) in Indian stock market. The data comprised of 65 companies for dividend increase announcement, 42 companies for bonus issue announcement and 40 companies for rights issue announcement. The study concluded that the adjustment of stock prices to dividend increase announcement starts two days before the formal announcement was made and it was spread over two days till one day before the announcement. In case of bonus announcement, the adjustment of stock prices occurred exactly on the announcement day itself. Whereas in the case of announcement of rights issue, the adjustment of stock prices started one-day after the announcement and persisted till the next day (two days after the announcement). Thus, the study concluded that the Indian stock market responses in an expected direction to corporate announcements. However, it is argued that the speed of response depends on the kind of announcement. The empirical results indirectly supported the semi-strong form of efficient market hypothesis.

Similarly, Rao and Geetha (1996) undertook a comprehensive study to examine the semi-strong form of efficiency of the Indian stock market during the April 1991 to March 1994. The analysis was carried out for 83 dividend announcements, 23 half yearly earnings announcements, 15 rights issues and 5 bonus announcements.

The market model estimated to measure the scrip-wise systematic risk, using individual security returns as dependent on market returns, indicated that market factor determines equity returns only to the extent of 30% in India. This indicates that other factors specific to the industry and the firm affect individual returns. Serial correlation coefficient estimated to test the weak form efficiency of the given market indicated that, except for one-day lag, prices at distant lags are independent contributing to the fact that stock prices in Indian stock market exhibit random walk process. Concerning, half-yearly dividend, rights and bonus issues announcement in Indian companies, the study found that the market discounted the information released well in advance indicating lack of informational efficiency. The results indicated that one could not make excess money in the stock market by studying the patterns of abnormal returns of announcements made earlier. Thus, the study concluded that the Indian capital market is not semi-strong from efficient, in its strict sense.

In sum, the evidence in support of the informational content of dividends is overwhelming. Unexpected dividend changes do convey information to the market about expected future cash flows.

(b) Market reaction to stock dividend and split announcements

An important issue in corporate finance involves the inferences the market draws from managerial decisions. Event studies test also documented stock price responses to announcement of stock dividends and splits. Unlike most cash dividend changes, stock splits and stock dividends do not directly affect the future cash flows of the firm. According to the standard textbook treatment, these stock distributions are no more than the cosmetic accounting change with no direct cost or benefit. This implies that if managers could increase share prices by splitting their firm's stock, both over valued and under valued firms will chose to split their shares, eliminating the informational content of the decision.

The first such study of the semi-strong form of the EMH was conducted by Fama *et al*. (1969), (hereafter, FFJR). The study considered the behavior of abnormal security returns at the announcement of stock splits and examined two related questions. First, is there normally some ‘unusual’ behavior in the rates of return on a split security in the month surrounding the split? And second, if splits are associated into 'unusual' behavior of security returns, to what extent can this be accounted for relationships between splits and changes in other fundamental variables. The study used 940 splits between 1927 and 1959. The study provided evidence to the notion that stock splits are associated with substantial dividend increases. The market realizes this and uses the announcement of a split to reevaluate the stream of expected increase from the shares. Moreover, the evidence indicates that, on the average, the market's judgment concerning the information implications of split are fully reflected in the price of a share at least by the end of the split month but most probably almost immediately after the announcement date. Thus, the results of the study lend considerable support to the conclusion that the stock market is 'efficient' in the sense that stock prices adjust rapidly to new information. The study observed that apparently the market makes unbiased forecasts of the implications of a split for future dividends and these forecasts are fully reflected in the price of the security by the end of the split month.

Charest (1978a) examined the NYSE common stock returns around split events involving at least 5:4 ratios during the period 1947-67. It documented how stocks behave around three main types of split events: proposals, approvals and realization. It assessed the performance of various trading rules triggered by these events. The study found that the rules yielded positive measure excess returns in general. Yet some significant gains from trading based on split proposals appeared possible. However, the evidence was weakened by its dependence on the split stocks' performance in a short time period around the late fifties. The study also revealed that the stock returns were more volatile around split time and that the measure of average beta risk kept rising. The study concluded that the NYSE appears reasonably efficient with respect to publicly available stock split information, but less efficient estimated from the past literature. Though most methods used produce similar evidence, even if costly, to estimate risk and residuals in competing ways because sometime baffling behavior found one way can often be fruitfully explained or confirmed through comparisons with results obtained another way.

Likewise, Grinblatt *et al*. (1984) examined the valuation effects of stock splits and stock dividend announcements. The study reported that, on an average, there was a significant increase in a firm's stock price at the announcement that could not be attributed to any other contemporaneous firm-specific announcements. This increase may be partially due to forecasts of imminent increases in cash dividends, but a sub sample of stocks that paid no dividends in three years prior to the announcement displayed similar price behavior. In addition, it documented significantly positive excess returns on and around the ex-dates of stock dividends and splits. Both announcement and ex-date returns were found to be larger for stock dividends than for stock splits.

A study by Ohlson and Penman (1985) analyzed the empirical behavior of stock return volatilities prior to and subsequent to the ex-dates of stock splits. The analysis was based on 1257 stock splits greater than or equal to 100 percent instituted by 910 firms between July 1962 and December 1981. The study deliberately avoided announcement effect of splits by focusing on returns following announcements but preceding the split date, and comparing those of returns subsequent to the split date. The evidence demonstrated rather unambiguously that there was, on the average, an approximately 30% 'arbitrary' increase in the return standard deviation following the ex-date. The increase was found for both daily and weekly data, and it was not temporary. Thus, the findings of the study were essentially inconsistent with the notion of 'rational pricing' and did not support the efficient market hypothesis.

Ramachandran (1985) examined the semi-strong form market efficiency by analyzing the impact of the announcement of bonus issues on equity share prices. The study considered 40 bonus issues declared during a six-year period and used the standard methodology of isolating the systematic influence of the market and examined the behavior of residual returns around the announcements. The behavior of residual returns suggested anticipation of the announcement by the market. The speed of adjustment of stock price to information was estimated by identifying the beginning and ending times of the adjustment process. For this, the study used a methodology based on the Shewhart control chart theory. The findings indicate the existence of two distinct clusters. The first cluster includes shares whose adjustment times to new information are short. The second cluster consists of shares with longer adjustment times. The findings, thus, indicate mixed evidence for the semi-strong form efficiency of Indian stock market.

Muscarella and Vetsupens (1986) studied the market reaction to announcements of stock dividends or stock splits by non - US companies whose shares trade in the US as American Depository Receipts (ADRs). The study examined the two traditional explanations for the stock price increase on split announcements viz. information signaling and improved liquidity for shares that trade at lower prices. The data set comprised 143 splits of foreign stocks and/or ADRs. The findings of the study were supportive of the liquidity explanation of stock split announcement effects. The study also reported that upon announcement of an ADR solo-split; both the ADR and the home price increase by statistically significant at 1% and 2%. The study further reported that the favorable price reaction to such events indicated that the market rewards firms that make their stock more accessible to US investors.

The anomalous behavior of the return distribution at the time of stock splits and stock dividends was reported by Brennan and Copeland (1988) that extended to the 'beta coefficients', which exhibits a temporary increase of about 20% at the time of the split announcement and increases about 30% at the time split becomes effective. In the 75 days following the split, the beta remains about 18% above its pre-split level. The data set comprised a sample of 1034 splits. These results were not consistent with the theory according to which the split announcement would constitute firm specific information and the split itself would have no effect on the risk of the split. The results were, however, consistent with the earlier puzzling findings of Ohlson and Penman (1985).

Likewise, Obaidullah (1992) examined stock price reaction to 75 bonus issues during 1987-89 period using fortnightly prices in Indian stock market. The residual returns around announcement period have been examined. The study found that cumulative average abnormal return (CAAR) experienced overall increase around announcement period. Increasing trend was noticed before announcement period thereby indicating that investors were able to predict the event. The absence of increasing trend after bonus announcement negates the presence of leaning lags. Based on these results, the study concluded that the dissemination of information occurred before the announcement. This evidence supports the semi-strong form EMH for Indian stock market. It was further observed that inaccuracy of stock price adjustment provides contradictory evidence and argued that a trading strategy based solely on public information such as buying-cum-bonus could lead to abnormal returns.

Dhatt *et al*. (1994) used event study methodology to show that stock dividends in Japan result in significant excess returns around the ex-day, which are very similar to those in US. The findings indicated that the ex-day effect is related to stock dividends per se and cannot be fully explained by characteristics of a particular market. The study used stock dividends ex-dates and daily returns of Tokyo Stock Exchange listed firms for the period 1977-88. An event window of 31 days centering on the ex-days is tested using the market model. The market parameters were estimated over 250 days, beginning 16 days after the ex-day. The results indicate excess returns (significant at the 1% level) on four days around the ex-day, i.e. days –1, 0, 1 and 2. The cumulative market excess return (CMER) are for all these four days is 2.06% ($z = 22.82$). Most of the excess returns occur on days –1 and 0, the CMER for these two days is 1.76%. The findings of the study indicate that the ex-day effect is related to stock dividends per se, rather than being driven by market imperfections. The study also revealed that the largest stock dividend yield is followed by the highest excess returns. However, the smallest stock dividends have the second highest stock return. This suggests that the ex-day effect for stock dividends of different sizes is driven by different factors. The excess return for small stock dividends may be mainly due to market imperfections, whereas those for large stock dividend may primarily reflect buying pressure from small investors. The study, thus, concluded with the view that despite the identification of the precise factors behind the ex-day effect remains a challenge for future researchers, the existence of the effect itself can scarcely be denied.

(c) Rights announcement effects

Rights give the shareholders the option to purchase new shares at less than market prices. Given the investment policy of the firm, a rights offering will lower the price of the stock in both the short run and in the long run. The fall in the stock price on the ex-rights day is similar to the expected fall in the stock price at the ex-dividend date. The two cases differ only in what is distributed – in later instance cash, in the former rights. Thus, the fall in stock price simply reflects the fact that the shareholders have been given a valuable asset, the right.

The argument that the fall in the stock price is a relevant cost of rights offering also appears in two related forms: (1) if an underwriter is used, the firm can raise a greater amount of capital with the same number of shares; (2) a rights offering lowers the earnings per share of the firm. Both statements are true but if the fall in the stock price equals market value of rights, then the impact of additional shares issued through the rights offering is the same as that of the stock split and the wealth of the owners is unaffected.

In this connection, Nelson (1965) studied 380 rights issues made on the NYSE between 1946 and 1957. The study focused on the date six months before an announcement, the ex-rights (also record) date, and the date six months after close of rights trading. Prices were adjusted by industry indices. It was reported that the difference between six month before the announcement to six month after the close of rights trading showed a drop in prices by only 0.2 percent. Thus, the effect of announcement of rights issue on share prices was found to be insignificant.

On the other hand, Merret *et al*. (1967) studied 110 UK rights issues made in 1963. After adjustment with the Daily Mail Index, the study revealed that actual ex-rights prices were about

1.23 percent higher than theoretically predicted. Using share prices one-year after the ex-rights date, it was concluded that rights issues were under valued by 3.20 percent at issue. The study further observed that this would lead to wealth transfers from the old to new shareholders and reported the underwriting premium to be excessive.

Positive abnormal returns associated with a right issue were also reported by James Lee (1972). This was based on divergent expectations between management and shareholders that leads to systematic under-valuation of shares. It was also assumed that a shareholder could either subscribe fully or sell his rights. Keane (1972, 1973) contended that the James Lee (1972) model is based on market imperfection and without this assumption issue prices are irrelevant. The study also argued that the subscription price always be set low enough and underwriting be avoided.

Similarly, Smith (1977) studied 853 US rights issues made between 1926 and 1975. The study used monthly data and FFJR (1969) methodology, and examined the behavior of stock prices around the issue period. There was significant positive abnormal performance prior to the issue, but all residuals were insignificantly different from event month 'minus two' to twelve months after the event month. The impression that rights offering lowered prices was not true. Performance in the prior period arises from selection bias, since firms that do well tend to raise capital. The removal of pre-emptive rights provision in sample of 89 firms seemed to have no price impact.

Marsh (1979) investigated the efficiency of the UK market, focusing on the 24-month post announcement period, using monthly and quarterly data. Two methodologies were used. The first was a two-stage time series methodology on 254 issues made between 1955 and 1972. Several return estimation models were employed (market adjusted return, FFJR, Sharpe-Litner Capital Asset Pricing Model (CAPM) using a comparison portfolio of firms in the same industry which did not made rights issues). A single-stage cross sectional model was used on 997 issues between 1962 and 1974. The CAPM was fitted for each six periods around the date of the issue (one year before, one month and two years after, the week and month beginning on the last cum-date and the period from the day before the announcement to month after). The results confirmed that the stock market was efficient. There was a small decline of 0.5 percent to 1 percent when the shares were went ex-rights.

On the other hand, White and Lusztig (1980) examined 90 US rights issues made between 1962 and 1972, using daily data testing both announcement effect and market efficiency. A pooled cross section time series model was used. This was the market model with dummy variables for the rights announcement; dividend increases and decreases, and miscellaneous information (single dummy variable for all other information). The regression was done for the period 90 days before to 45 days after the announcement (this truncation was to avoid biases from changes in real assets). The estimation period was 260 days, ending 130 days before the announcement period. There was a negative announcement effect (-1.0%). It was reported that prices adjusted quickly indicating that market was efficient.

Dann and Mikkleson (1984) analyzed 132 public convertible bond offerings made between 1969 and 1979 and 38 rights issues of convertible bonds made between 1965 and 1979. Both announcement period and issue period performance were measured for the former and only announcement period performances were measured for the later. The market model was estimated on daily return for the period 200 trading days before the event date to 200 trading days after, excluding 121 trading days centered on the event date. The two-day announcement period abnormal return was –1.23% for right issues following a positive abnormal return of 8.23% from trading day –60 to day –2. The abnormal return was not statistically different from that of the public convertible issues (although the later was roughly twice as large as –2.30%). The absence of difference was interpreted, as implying that original price under-pricing was not explanation for the negative announcement period return for public convertible debt (CD) issues. Rights issues, even if under-priced, do not affect the wealth of current owners. For the public CD issues, a 1.54% abnormal return was found on the issuance date. No satisfactory explanation of this was offered.

Shrinivashan (1993) examined security price behavior associated with rights issues related events to provide evidence on corporate capital structure and capital market efficiency of the Indian stock market. The study used a sample of rights issues of 31 equity and 27 fully convertible debentures (FCD) issues made by 50 companies between 1985 and 1991. The study found that equity issues were accompanied by significant negative abnormal performance on the board meeting and letter of offer dates. There were no other abnormal performances for FCD issues expect on the conversion date. The study observed that methodology does not make a difference to the results. There are significant abnormal performances on both equity and FCD ex-rights dates. Based on these results, it was concluded that the Indian capital market is semi-strong efficient.

The stock price behavior during announcements of share distribution in the form of rights and bonus issues in the Malaysian stock market was examined by Isa and Tan (1996). The study used daily price data for companies making such announcements over the period 1983-91. Stock returns were adjusted against the Kuala Lumpur Stock Exchange (KLSE) composite index returns to obtain the abnormal returns. It was reported that in case of companies with positive value of rights, the CAAR showed an increasing trend from the beginning of the event window up to the announcement day and it stabilized thereafter. Thus, the study observed that assuming there were early signals of firms planning for a rights issue, the behavior of the market was consistent with the notion of market efficiency. However, in case of companies having a negative value of rights the CAAR did not depict any particular trend prior to the announcement. However, the CAAR experienced large drops for the two consecutive announcement days and then continued to decline over the following three weeks until it reached a low of –18.05% on day 17, before leveling off. Thus, the study found the behavior of this CAAR to be inconsistent with an efficient market situation. Analysis on the rights further revealed that the market reacts not to the rights issue per se, but to the information content of the announcement. As for bonus issues, the results show a puzzling phenomenon. The market reacts strongly and positively to a bonus announcement and such behavior was found to be contrary to a rational behavior in an efficient stock market.

Finally, Kabir and Roosenboom (2003) used the standard event methodology to measure share price reaction to 58 equity rights offering announcements in Netherlands during the period January 1984 to December 1995. It also examined whether the stock market valuation is consistent with subsequent operating performance of firms. The study observed that a statistically significant stock price decline takes place when companies announce rights issues. Further, the study reported that stock price decline was observed during the subscription period. The study then analyzed post rights issue operating performance of the firms and found that consistent with the announcement period decline in stock price and rights issuing firm subsequently exhibit a statistically significant decline in their operating performance. The analysis of the operating performance of issuing firms shows a significant worsening from one-year up to five years after rights issues. It indicated that the stock market was able to anticipate already at the time of rights issue announcement the subsequent change in operating performance of issuing firms. Thus, the study provided direct evidence on the link between stock market response to an information event and the resulting change in operating performance.

(d) Stock price reaction to earnings announcement

There have been many studies of the price reaction to the earnings announcement event. The most comprehensive is the study by Rendleman *et al*. (1982) (RJL).

The study separated firms into 10 groups according to the nature of their earnings report in a given quarter. To group the firms, it was first estimated what the earnings per share will be according to a statistical analysis of the firm's quarterly earnings' numbers in the past. The study then compared the actual earnings reported with the statistical estimate. If actual earnings were more than 2 standard deviations above their estimate, the firm was put in group 10. If the actual number was between 1.50 and 2.00 standard deviations above the mean, the firm was put in group 9. This process continued through group 1, which was composed of those firms that report earnings more than 2 standard deviations below the estimated value.

The stock prices appeared to begin reacting to the earnings numbers up to 20 days before the announcement was made. This was probably accounted for leakages of inside information. There was also evidence of a sizeable reaction in the immediate vicinity of the event. So far, all this was consistent with market efficiency. However, in those cases in which the earnings numbers were extremely good or extremely bad, there appeared to be a delayed reaction that continued up to 90 days after the announcement. The results indicate that some inside information were impounded in stock prices. The stock price, however, did not fully react to the public announcement of the earnings report until a full 90 days after the report was released. The results were, therefore, inconsistent with the semi-strong form of the efficient markets hypothesis.

One of the early classic studies on the effect of earnings information release on trading volume and variability of security return was conducted by Beaver (1968). The study controlled for the possibility of non-earnings related factors inducing trading volume at the time of earnings releases. Using a sample of 143 securities over the 1961–1965 periods, it restricted the sample to non-December 31 fiscal year securities in order to minimize the effect of December–January tax-induced trading volume. Further it was controlled for the effect of dividend announcement by restricting the sample to firms that had no dividend announcement in the week of the annual earnings announcement.

The study used the trading volume activity (TVA_{jt}) measure to examine weekly trading volume for a period over 17 weeks surrounding the earnings announcement week. It showed a dramatic increase in trading volume in the announcement week (i.e., week 0). The second phase of the study looked at the variability of security returns in the same 17-week period surrounding the annual announcement as before. Using the security returns variability (SRV) measure, it analyzed the variation in returns over the 17-week period. Security returns were found to be 67% higher in the earnings announcement week than in the non-earnings announcement period.

Similarly, Patell and Wolfson (1983) have used earnings release information to study the intraday behavior of security returns of securities on the NYSE and American Stock Exchange (ASE). The study observed price changes in a 26-hour trading period surrounding each announcement. The conclusion drawn was that there is a very strong reaction at the announcement, the major portion of which decays within two hours, but with detectable traces that lingers into the following day.

Likewise, Foster (1986) used the SRV_{it} measure to study 53 US securities in interim and annual earnings announcements over the 1963–1978 periods. The study further partitioned the sample into eight industries to see whether differences in SRV_{it} existed across the industries. The industries were photographic equipment and supplies; flat glass; motor vehicles and car bodies; bakery products; banks (all located in New York City); bottled and canned soft drinks; savings and loan associations; and radio and television broadcasters. It was concluded that industry membership was an important variable in explaining the differences across firms of the values of the SRV_{it} statistic at the time of earnings release.

In identifying other variables to explain differences in the magnitude of the security return variability associated with earnings releases, Richardson (1984) studied 153 NYSE equities. The study focused on annual earnings reports made in the 1976–1978 period. Using the SRV_{it} measure, the study reported a 40% increase in the variability of security returns in the earnings announcement week. The study partitioned the sample into firm size deciles based on market capitalization. It then examined the mean SRV_{it} and the mean of other variables for each of the deciles.

Other variables in the study used included:

- Measures of the extent of information available to market participants, such as (a) the presence or absence of analyst earnings forecasts reported in *The Earnings Forecaster* and (b) the natural log of the number of *The Wall Street Journal* news items in the 12 months prior to the announcement.

- Measures of the extent of information available from macro sources. The proxy used was R^2 from a regression of each equity's earnings on an economy-wide earnings index. The motivation for this measure was that earnings reports for low R^2 firms tend to be less prompted by macro information sources, making earnings a relatively more important source of information for investors interested in such equities, compared to high R^2 equities.

Ball and Brown (1968) studied public announcements of earnings by corporate firms for the period 1946-66. The study examined the deviations from normal rates of return for 261 firms to detect the effect of annual earnings announcements. The firms were classified into two groups, one whose earnings for a given year increased relative to the market and other whose earnings decreased relative to the market. It was revealed that the average rates of return for stocks with increased earnings rose throughout the year preceding the announcement. For stocks with decreased earnings, the opposite was true. In other words, most of the information in the earnings announcement had been anticipated by the market and on the average only 10% of the cumulative unsystematic price adjustment occurred after the earnings were announced.

In a like fashion, Brown and Kennelly (1972) studied the information content of quarterly earnings of 94 firms during the seventeen-year period 1951-67. The study predicted earnings per share (EPS) using four naive models and a regression model. Forecasts were then subtracted from actual to find whether the news was good, indifferent or bad. As in Ball and Brown (1968), API and chi-square statistics were used. It was reported that the regression models were neither bad nor worse than the naive models and the most of information contained in reported annual earnings per share (EPS) was incorporated well in advance of the announcement date. The large values of chi-square around quarterly announcements indicated that the market is able to discount the anticipated annual EPS better. Furthermore, the market's anticipation of actual EPS is sufficiently accurate that its release does not appear to cause any unusual jumps in the API in the announcement month.

Joy *et al*. (1977) examined prices and quarterly earnings over the period 1963-68. The earnings for each quarter were compared within the earnings for the same quarter in the previous year. If the current quarter's earnings were 40% or more above the earnings of the same quarter in the previous year, the earnings were classified as substantially better than expected. The study noticed that stocks whose earnings were substantially greater than expected generated positive abnormal returns while those with earnings substantially below expectations generated negative abnormal returns. The earnings changes were not totally unexpected since a majority of the cumulative average abnormal returns occurred before the release of the earnings announcement. However, after announcement of earnings, stocks that reported earnings substantially above those of the previous year, continued to generate positive abnormal returns. According to the study, investors could have earned positive abnormal returns of approximately 6.5% over the next 26 weeks after the announcement by simply buying stocks that reported earnings 40% above the previous years' quarterly earnings. The results reported in the study were evidence against the semi-strong form EMH.

Ball (1978) in a survey article reviewed over 20 different studies which reported abnormal returns. The study noted that the market reaction to earnings announcement reveals post announcement excess returns if taken at face value studies. Abnormal risk adjusted returns are systematically non-zero in the period following the announcement. However, the study attributed this to inadequacies in the capital asset pricing model (CAPM) used to adjust for risk differentials and suggested several steps to reduce the estimation bias.

Daily stock price behavior to determine whether earnings forecasts by management contain information for investors causing them to revise their expectations was examined by Jaggi (1978). The OLS regression was estimated by using 119 returns for each forecast observation, 59 returns were taken before the forecast date and 60 returns after the date during the period 1971-74. Daily stock prices were collected for 141 days, 70 before and 70 days after the critical date. The critical date (the event date) was the date when the earnings forecasts were published in the Wall Street Journal. Returns for the test period of twenty-one days surrounding the event date were not included. It was reported that stock price adjustments took place during the critical period, thus, lending support to the semi-strong form of EMH. The study indicated that voluntary disclosure of earnings forecasts might provide some additional information to investors. However, it was cautioned that even though price adjustments were observed, this does not necessarily imply that the contents of the forecasts caused investors to revise their expectations. These adjustments may be caused by other factors or even by the mere act of voluntary earnings forecast announcement.

Watts (1978) studied the abnormal returns following quarterly earnings announcements in US stock markets for the period 1950-1969. The study noticed significant returns after the earnings announcement. Hence, the findings of earlier studies were confirmed. Further, it was examined whether abnormal returns could be explained by deficiencies in capital asset pricing model. The study reported that deficiencies in capital asset pricing model couldn't be accepted as an explanation of the observed abnormal returns. The observed abnormal returns after quarterly earnings announcements imply that the market is inefficient at least in the period, 1962-65. However, the inefficiency is not substantial. It was concluded that only those who can avoid some of the direct transaction costs like brokers could make abnormal returns after quarterly earnings announcements.

Foster and Shevlin (1984) used a sample of over 56,000 observations covering the 1974-81 time periods to measure the information content surrounding earnings announcement. The study used four expectation models of estimating unexpected earnings and by computing Spearman's rank correlation between median values of forecast errors (FE) of each model. It was reported that for a class of expectation model based on time series of reported quarterly earnings, the sign and magnitude of FE and firm size independently explain 81% and 61% respectively of the variation in post announcement drifts. The later models based on security returns exhibited no evidence of systematic post announcement drift behavior because it was less vulnerable to the 'proxy effect' criticism.

A study by Obaidullah (1990) in Indian stock market used weekly return data for a sample of 330 companies, which announced their half-yearly earnings for the period ending September 1989. The sample included those companies which had reported unexpectedly good performance. Increasing trend was noticed much before the announcement week, implying that the markets are, to some extent, able to anticipate the good news. This is a sign of efficiency. Further, the study reported that the systematic market reaction continued in the post announcement period. On this basis, it was concluded that the semi-strong form EMH could not be accepted for the Indian stock market.

In another study, Obaidullah (1991) examined the nature of stock price reaction to announcement of annual earnings to the public. This was studied by an examination of Cumulative Average Abnormal Returns (CAAR) around the event. The computation of CAAR involved regression of fortnightly stock returns of each sampled company against the returns of the market index (Economic Times Ordinary Share Price Index) over a period of nearly five years; from January 1986 to September 1990, thus utilizing 123 pairs of observations. The sample for the study comprised of the 145 earnings announcement made by 125 companies during the period 1987-90. The behavior of CAAR around the announcement provided evidence on the speed of stock price adjustment. The study revealed that fluctuations during the post announcement period were random and no significant drift was noticed. Thus, the study showed that there is no evidence against market efficiency in Indian stock market.

The study also examined the accuracy of price adjustment to earnings announcement. It examined whether small or large unexpected earnings changes were associated with price revisions of similar magnitude, by estimating the residual returns unexpected earnings correlation. The poor showing of earnings as an explanatory variable of stock returns (the maximum explanatory point observed being a mere 14.4%) strongly indicated investor irrationality. This means, investors systematically err in formation interpretation. They over react to or ignore value relevant information. The inappropriate response or inaccurate price adjustment reflected in the low correlation between stock return and value relevant information. This was taken as an evidence of market inefficiency.

The stock price response, before and after the half-yearly earnings announcements in relation to the standardized unexpected earnings (SUE) was examined by Chaturvedi (1997) in Indian stock market. An ancillary purpose was to investigate if strategies based on information contained in earnings announcement could be used to outperform the market. In this context, the behavior of stock prices has been examined in the pre and post announcement periods in relation to the unexpected earnings defined in two ways i.e. sign of the unexpected earnings and the standardized unexpected earnings (SUEs), and the price-earning (P/E) ratios. The unexpected earnings are the difference between the reported earnings and the expected earnings estimated by using the seasonal random walk model. The period of study was from January 1990 to March 1996. The study utilized a sample of 90 companies, which was classified into one of the five SUE categories based on SUE values at the time of each earnings announcement. In addition, each SUE category was constructed to have identical beta risk of unity. SUE was observed to discriminate effectively in the pre and post announcement periods. The difference in cumulative abnormal returns between the highest and the lowest SUE categories with identical beta risk was positive for the event window and all the control periods. The study concluded that there was scope for earnings abnormal returns by using specific strategies, which suggested that efficient market hypothesis, did not exist during the study period.

(e) Stock market reaction on miscellaneous events

Besides the specific events like announcement of dividends, stock dividends and splits, rights and earnings; stock market reaction for other types of announcements such as announcement of discount rate by central banks, public issue of securities, revaluation of assets etc. were also tested to identify the degree of efficiency of market.

Accordingly, Waud (1970) used the residual analysis to examine the effects of announcement of discount rate changes by Federal Reserve Bank. The residuals were essentially just the deviations of the daily return on the Standard and Poor's 500 Index from the average daily returns. The evidence of a statistically significant announcement effect on the stock returns for the first trading day following an announcement was observed. However, the magnitude of the announcement effect was small, never exceeding 0.5%. The study concluded that the market anticipated the announcement, thereby, lending further support to the semi-strong efficiency of the market.

Similarly, Scholes (1972) analyzed the effects of the distribution per se from the informational content of distribution. Following FFJR's (1969) methodology, it was observed that, on the average, the price of a common stock declines between 1% and 2%, when a secondary offering was made. The study did not attribute this to selling pressure. No relationship between the sizes of the block, either absolutely or as a percentage of the outstanding stock, and the size of the decline was noticed. It was concluded that the decline was caused by the information implicit in the offering. When offerings were classified by type of vendor, those made by corporations or corporate officers were associated with largest relative price declines. Moreover, the full price effects of the secondary offerings were reflected within six-days. Since the Security and Exchange Commission (SEC) does not require identification of the vendor until six days after the offering, this implies that the market anticipates the informational content of the offering. The study extended analysis to news issues, and the results also supported the notion of market efficiency.

The relationship between the share prices and revaluation of assets of a sample of relatively large Australian public companies was examined by Sharpe and Walker (1975). It announced upward asset revaluation of assets that improved the cumulative average increase in returns by 18 or 19% above the expected from the general state of stock markets. These shifts in stock prices were continued over the post announcement months. The result showed that profitable trading opportunity exists even after the announcement of revaluation of assets. The principal findings of the study were: (i) after adjusting for any possible changes in volatility and standarding somewhat crudely for earnings and dividend behavior, the results are consistent with hypothesis that the market regards an announcement of assets revaluation as information of significance; (ii) the market appears to absorb the information content of asset revaluation quickly into security prices; and (iii) there is little evidence to support the view that announcement of revaluation is associated with systematic changes in the volatility of a stock's return relative to the market.

Ball *et al*. (1977) reported abnormal returns on Australian share price during the period 1960 to 1969 around the time of announcement of capitalization changes through bonus and right issues and share splits. Following FFJR, the study argued that the observed abnormal returns were due to information concerning anticipated cash flows, and not due to the increased number of shares, which resulted from the capitalization changes. The study reported that from monthly data, the Australian share market appears to have been efficient with respect to the announcement of rights and bonus issues. Further, all the price adjustment to a bonus issue occurs within a day or so of the announcement. However, in case of share splits the upward drift in share prices did not begin until approximately six month after the split announcement. The study observed the efficiency of market reaction to bonus and rights issues and noticed implausible that a reaction to share splits commenced six months after their announcement. The study concluded that this result, therefore, is anomalous.

Shevlin (1981) conducted a study to test on various methodologies, which have been used in empirical tests of the semi-strong efficient market hypothesis. The methodologies tested were the zero-one model, the market model, the cross sectional model and the mean adjusted model. Further, the applicability and performance of parametric and non-parametric significance tests was examined. Two different non-parametric tests, the Wilcoxon signed-ranks statistic and the sign test, and various different versions of the parametric t-tests were employed to test the null hypothesis of abnormal performance. The study reported that in the event month, test methodologies performed as well as one another with the exception of the mean adjusted model in the event month clustering tests. This result is consistent with Brown and Warner (1980). In the event period tests the zero-one model tended to perform as well as, if not better than the market and cross sectional models, with the mean adjusted model being totally unsuited to this test period. The study further reported that in relation to the significance test statistics the results were not so clear. The study concluded that the tests for abnormal performance are most powerful when (i) the market reaction is concentrated within one or two months of the announcement date that announcement date is accurately determined, and (ii) the researcher conducts the tests in each of these months rather than the tests for the mean abnormal returns over the extended event period.

Myers and Majluf (1984) were the first to show that managers with superior private information had incentives to issue equity when the prevailing market price of shares is larger than their intrinsic value i.e. the stock is over valued. Knowing that mangers will avoid issuing undervalued shares, investors interpreted an equity issue as a signal of over valuation. The study further stated that conflict between old and new shareholders, a crucial feature in their model, could be resolved if old shareholders could be compelled to exercise their rights. All wealth effects of financing and investment decisions would then fall on the old shareholders.

In a classic study, Brown and Warner (1985) examined how the particular characteristics of daily stock returns data affect event study methodologies by constructing 250 samples of 50 securities. Events were selected with replacement and were assumed to occur with equal probability on each trading day from July 2, 1962 through December 31, 1979. Using simulation procedure with actual daily data, the study investigated the impact of a number of potential problems of concern in the literature. These include (i) non-normality of returns and excess returns (ii) bias in OLS estimates of market model parameters in the presence of non-synchronous trading, and (iii) estimation of variance to be used in hypothesis tests concerning the mean excess return, and specifically the issues of autocorrelation in daily excess returns and of variance increases on the days around an event. In addition, the effect of cross-sectional dependence of excess returns on variance estimation, which is an issue even with monthly data, was also investigated. The study concluded that non-normality of daily excess returns had no obvious impact on event study methodologies. Further, procedures other than OLS for estimating the market model in the presence of non-synchronous trading convey no clear-cut benefit in detecting abnormal performance. However, the choice of variance estimator to be used in hypothesis tests is of some concern, affecting both the specification and power of the tests.

The impact of major political and economic events on stock prices was examined by Subramanian (1989) for the period 1979-86 in Indian stock market. The data comprised the daily closing prices of 45 companies. The Financial Express Equity Index was used as the market proxy. The study analyzed fifteen major political events and release of macro-economic information such as credit policy, and announcement of M1, M3 and wholesale price index (WPI). The speed of reaction of the market index and prices of sampled shares to political events was determined.

The findings of the study provided mixed evidence for semi-strong form of market efficiency. The post-event adjustment was observed to be a bit long. A further examination of possibility of abnormal gains revealed that such possibility existed for same portfolios even after considering transaction costs. The methodology to study the impact of release of macro-economic information involved computing volatility of the market index and prices of the sampled shares around the event. This was measured as ratio of the variance of returns on dates of release of the information and variances of returns on all other days. The findings indicated pronounced volatility on dates of releases of information of the monetary variables, monetary policies changes and on dates of budget changes. Lack of volatility around dates of releases of WPI indicates that it has no information value.

To sum, this section examined the efficient market theory and presented a review of major studies relating to the semi-strong efficiency of the markets. In general, the available evidence supports the semi-strong form of efficiency of the capital markets. However, some anomalous price behavior has also been documented thereby negating the efficiency at semi-strong level. It is noteworthy that in reality markets are neither perfectly efficient nor completely inefficient. All of them are efficient to a certain degree. The emergence of new technology probably serves to make them more efficient. It is true that some markets are more efficient than others. However, efficiency is an empirical issue, as it requires a continuous effort to test whether a particular market is efficient or not.

2.3 Methodology and estimation procedure

This section discusses the research methodology followed in the study to examine the announcement effect of cash dividends on equity share prices with a view to testing whether the Nepalese stock market is semi-strong efficient or not during the ten-year period from 1996 to 2005. The various aspects covered are: (a) data and their sources, (b) testable hypotheses, and (c) event study methodology. This section is divided into four sub-sections. Sub-section 2.3.1 gives the data and their sources, selection of enterprises and proxy for market portfolio. Sub-section 2.3.2 specifies the hypotheses that are tested in the study. Sub-section 2.3.3 provides the estimation procedure and sub-section 2.3.4 discusses the 'event study methodology' used for testing the semi-strong form efficiency of the Nepalese stock market.

2.3.1 Data and their sources

(a) Selection of enterprises

The event of the study is the cash dividend announcement by Nepalese enterprises during the period of 1996 to 2005.While selecting the enterprises, the data have been screened by using the various criteria such as the continuous trading by the listed companies in the stock exchange during the period, sufficient number of observation, absence of thin trading, availability of date of public announcement of cash dividend, stock trading on announcement date and the like. Using all these criteria, this study utilized only 190 cash dividend announcements for further screening. A comprehensive database has been created to separate the cash dividend, bonus share and rights announcement of the listed enterprises in Nepal Stock Exchange (NEPSE). In Nepal, it is common practice by the listed enterprises that they announce cash dividends along with stock dividends and rights issues, if any. A correct use of event study methodology requires excluding those announcements accompanied by the release of other relevant information. Therefore, this study excluded announcements contaminated by other concurrent firm specific events which included observations affected by announcements of stock dividends and announcements of rights, earnings and other events during the test window. Thus, the final sample contained 28 observations with no concurrent events during the test window. In total, the cash dividend announcements made by 21 enterprises over diverse industries are included for the purpose of the study.

The 'event day' for each company is taken as the date of 'Board of Directors Meeting' in which the decision to declare cash dividends were taken. Nepal Stock Exchange bye-laws require that each listed company should convey the price sensitive decision to NEPSE within 24 hours of such decision. NEPSE, immediately after receiving that information, publishes on its notice board for public information. Besides, listed companies also publish the notice of declaring dividends through print media. Thus, respective boards of director's decision date are considered as an event date for the purpose of this study.

The respective board meeting dates for cash dividend announcements have been collected from the official records of Nepal Stock Exchange Limited and selected enterprises. The necessary share price data and the NEPSE index values have been obtained from Nepal Stock Exchange annual report and database. The details relating to the selected enterprises for cash dividends announcements are presented in Table 2.1.

Table 2.1

Cash dividend announcement by selected enterprises

S.N.	Name of the Company	Cash Dividend	BOD Decision Date
1	Ace Finance Company Limited	20%	7 November 2000
2	Bank of Kathmandu Limited	10%	18 December 2001
3	Bank of Kathmandu Limited	10%	13 December 2004
4	Citizen Investment Trust	15%	19 June 2005
5	Everest Bank Limited	20%	13 September 2004
6	Himalayan Bank Limited	35%	12 January 1997
7	Kathmandu Finance Limited	5.27%	19 November 2004
8	Nabil Bank Limited	55%	13 January 2000
9	Nabil Bank Limited	50%	17 November 2003
10	Nepal Bangladesh Bank Limited	15%	30 March 1999
11	NIDC Capital Market Limited	15%	21 March 2002
12	National Finance Company Limited	30%	21 September 2001
13	Nepal Finance and Savings Company Limited	15%	30 December 1999
14	Nepal Housing Development Finance Limited	12%	24 November 1999
15	Nepal Housing Development Finance Limited	10%	8 February 2001
16	Nepal Investment Bank Limited	50%	12 January 1999
17	Nepal Investment Bank Limited	20%	25 November 2003
18	Nepal Merchant Bank and Finance Limited	25%	28 February 2002
19	Peoples Finance Limited	10%	11 November 2004
20	Nepal SBI Bank Limited	20%	18 December 1997
21	Nepal SBI Bank Limited	20%	17 February 1999
22	Standard Chartered Bank Nepal Limited	110%	23 November 2004
23	Standard Chartered Bank Nepal Limited	80%	7 January 2000
24	Universal Finance and Capital Market Limited	8.11%	18 December 2002
25	United Insurance Company Limited	10%	8 January 1998
26	United Insurance Company Limited	10%	3 April 2000
27	Uniliver Nepal Limited	350%	9 August 2005

28	Union Finance Company Limited	10%	25 February 2003

Note: Cash dividends are expressed in percent of paid-up capital.

It is notable that most of the studies used daily data; where as the earlier studies (e.g. FFJR (1969)) used monthly data. The use of monthly data made measurement much more difficult because there are many surprises in a month besides the announcement effect being examined in a particular study. Besides, it is irrelevant to make study based upon monthly data in less maturing markets having no long history like in Nepal. For examining the effect of the event on market efficiency, it is important to measure the impact of the announcement using smallest feasible interval. Thus, this study has used daily price data of the selected enterprises for examining the impact of events, i.e. cash dividends announcements on Nepalese stock market.

(b) The period of the study

The period covered in the study is the most recent 10 years from 1996 through 2005. There are two observations taken from the year 1997, one from 1998, five from 1999, four from 2000, and each three from 2001, 2002 and 2003 respectively. Similarly five observations are from 2004 and two from to 2005.Thus, the number of dividend announcements (observations) spread over the entire period of study. It is felt that the period is sufficiently long and appropriate enough for testing the announcement effects of dividend declaration on equity share prices.

(c) The proxy for market portfolio

For estimation of normal or expected return for each of the sample companies, a proxy for the market portfolio is required. In most of the earlier studies, the researchers have used some stock price index as a proxy for the market portfolio. As in other countries, in Nepal, stock market index is available. However, in other countries there are several stock market indexes available and they differ with one another, inter-alias, in respect of (a) coverage, (b) weighting system, (c) method of construction, and (d) periodicity with which they are available. Such problems of screening the indexes have not been encountered in Nepal with the availability of only one index, that is, NEPSE index.

No doubt, it becomes an issue as to which index the researcher should use to proxy the market portfolio. The choice of index has largely been dependent upon by its suitability in a particular situation. However, in this study there is no choice except to use Nepal Stock Exchange index (NEPSE) as a proxy for market portfolio. The index is based upon all the listed equity shares in Nepal Stock Exchange Limited. The method of compilation of this index is the same as used by the Standard and Poor, USA in the construction of their price indices.

2.3.2 Testable hypotheses

The study attempts to test the following hypotheses concerning the announcement effects of cash dividends on equity prices:

- It is hypothesized that around the time of capitalization changes in the form of cash dividend any systematic share price revision is due to information concerning future cash flows rather than due to cash dividends.

- Cash dividends have no significant impact on abnormal returns over the event window. Thus, null hypothesis is that average abnormal returns over the event window are not significantly different from zero.

- It is hypothesized that adjustment of stock prices to new equilibrium prices and expected returns take place at or before the arrival of news concerning cash dividends and that above or below equilibrium prices and expected returns do not occur thereafter.

2.3.3 Estimation

The study has utilized an 'event window' of 41 days (-20 to +20 days) centered on the event day (t = 0) to examine the announcement effects of cash dividends on equity share prices. The event day for each enterprise was taken as the "Date of Board of Director's Meeting" in which the decision to declare the cash dividend is taken and immediately noticed to the Nepal Stock Exchange Limited. For estimating the expected or normal return in terms of the market model, the study has used an 'estimation window' of –91 to –21 days before the event day.

2.3.4 Event study methodology

The notion of informationally efficient markets leads to a powerful research methodology. If security prices reflect all currently available information, then price changes must reflect new information. Therefore, it seems that one should be able to measure the importance of an event of interest by examining price changes during the period in which the event occurs.

The impact of dividend announcement on share prices, have been examined by using the popular 'event study methodology'. Historically, the methodology was first used by Ball and Brown (1968). However, FFJR (1969) popularized the use of the methodology for testing the semi-strong version of the EMH. Ball and Brown considered the information content of earnings, and Fama *et al*. studied the effects of stock splits after removing the effects of simultaneous dividend increases. It has since then been used by a number of researchers for studying the impact of variety of events on share prices. Therefore, it will be useful to briefly discuss the procedure adopted in using the event study methodology.

The steps involved in using the event study methodologies are: (a) Define the event of interest, (b) specify day of announcement of an event, (c) specify the window period, (d) compute observed returns for selected enterprises and for the market portfolio, (e) compute expected or normal returns, (f) compute abnormal returns for the window period for the selected enterprises, (g) compute average abnormal return (AAR) for each day in the event period, (h) compute cumulative average abnormal return (CAAR), and (i) conduct tests for significance. A brief description of these steps is given below:

(a) Define the event of interest

The first step involved is to identify the event to be studied and collection of a sample of companies that had a surprise announcement of that event during the announcement period. It is well known that share prices change due to some announcement that is considered as a surprise by investors. Therefore, events such as an announcement of a merger, a bonus issue, or a right issue can well be treated as a surprise to investors. In other cases, such as the impact of earnings announcement, it is considered to be more complicated. In such cases, it is necessary to define as to what constitute a surprise. This can be done by comparing announcements with earnings forecasts made by the professional analysts. Therefore, in order to form a sample of surprise, one first separates out a group of firms where the announcement is significantly different from what is being forecasted. Since positive and negative surprises would affect price differently, this group is further separated into two groups, one for positive and one for negative earnings surprises.

As mentioned earlier, cash dividends declaration by the Nepalese enterprises have been chosen as the event for the purpose of this study.

(b) Specify day of announcement of an event

The next step is specification of the announcement date or what is called the event date. The event day for each enterprise has been taken as the date of "Board of Directors' Meeting" in which the decision to declare the dividend was taken and immediately informed to Nepal Stock Exchange Limited. The date is designated as t = 0. In this study, the BOD decision dates are taken as event announcement date.

(c) Specify the window period

This step involves the specification of the 'event window period'. The researcher has to decide and specify the number of days in the window period, sufficient enough to see the impact of the event on share prices. In this study, a window period has been designated as -20, -19, -18, ….-1, as the 20 days prior to the event, 0 as the event day, and +1, +2, +3, …… +20 days after the event day.

(d) Compute observed returns for selected enterprises and for the market portfolio

The daily returns for each selected enterprise has been computed for the 'estimation window period' and for the 'event window period' as:

$$R_{it} = (P_{it} - P_{it-1}) \Big/ P_{it-1}$$

Where, P_{it} and P_{it-1} are the respective daily prices for company at time 't' and 't-1'. Analogously, the actual returns for the market are also computed as:

$$R_{mt} = I_t - I_{t-1} \Big/ I_{t-1}$$

Where, 'I_t' and 'I_{t-1}' are the respective daily index values at time 't' and 't-1'. As mentioned earlier, the study has used a window period of 41 days, 20 before the event plus 20 days after the event. Therefore, for all these days the actual returns for each selected enterprise for the event has been computed separately by using equation above.

(e) Compute expected or normal returns

A number of approaches are available to calculate the normal return of a given security. The approaches can be loosely grouped into two categories – statistical and economic. Models in the first category follow from statistical assumptions concerning the behavior of asset returns and do not depend on any economic arguments. In contrast, models in the second category rely on assumptions concerning investors' behavior and are not based solely on statistical assumptions. It should, however, be noted that to use economic models in practice it is necessary to add statistical assumptions. Thus the potential advantage of economic models is not the absence of statistical assumptions, but the opportunity to calculate more precise measure of the normal return using economic restrictions.

For the statistical models, the assumption that returns are jointly multivariate normal and independently and identically distributed through time is imposed. This distributional assumption is sufficient for the constant mean return model and market model to be correctly specified. While this assumption is strong, in practice it generally does not lead to problems because the assumption is empirically reasonable.

Different researchers have used different models for computing expected returns. There are several equilibrium models such as capital asset pricing model (CAPM), the arbitrage pricing theory (APT) model etc. that could be used to estimate expected return. Several studies have also used the famous market model to estimate expected return. Finally, a number of studies simply use the returns on a market index as the expected return.

In this study, the expected return on a stock have been estimated using the market model given in the following equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

$$\mathrm{E}\,(\varepsilon_{it}) = 0 \qquad \mathrm{Var}\,(\varepsilon_{it}) = \sigma^2_{\varepsilon i}$$

Where, R_{it} is the observed daily return for the share of a company 'i' at time'
t',

α_i is the estimate of the intercept for share of company 'i',

β_i is the estimate for beta of share of company 'i'

R_{mt} is the observed daily return for the market index at time 't'

ε_{it} is the independently and identically distributed residual error term ε_{it}

Table 2.2

Estimated market model parameters for selected enterprises

S.N.	Name of the Company	Alpha (α)	Beta (β)
1	Ace Finance Company Limited	0.010	0.160
2	Bank of Kathmandu Limited	-0.002	1.038
3	Bank of Kathmandu Limited	-0.001	1.653
4	Citizen Investment Trust	-0.001	0.106
5	Everest Bank Limited	0.003	1.108
6	Himalayan Bank Limited	-0.001	2.852
7	Kathmandu Finance Limited	-0.006	0.620
8	Nabil Bank Limited	-0.001	1.400
9	Nabil Bank Limited	0.000	0.533
10	Nepal Bangladesh Bank Limited	0.002	0.045
11	NIDC Capital Market Limited	-0.005	0.270
12	National Finance Company Limited	0.005	0.357
13	Nepal Finance and Savings Company Limited	-0.003	0.764
14	Nepal Housing Development Finance Limited	0.001	0.473
15	Nepal Housing Development Finance Limited	0.003	0.026
16	Nepal Investment Bank Limited	0.004	0.759
17	Nepal Investment Bank Limited	0.001	1.181
18	Nepal Merchant Bank and Finance Limited	0.001	0.636
19	Peoples Finance Limited	-0.005	-1.410
20	Nepal SBI Bank Limited	0.002	0.186
21	Nepal SBI Bank Limited	0.000	0.813
22	Standard Chartered Bank Nepal Limited	-0.001	0.813
23	Standard Chartered Bank Nepal Limited	-0.001	0.186
24	Universal Finance and Capital Market Limited	0.000	0.049
25	United Insurance Company Limited	0.001	0.060
26	United Insurance Company Limited	0.004	0.539
27	Uniliver Nepal Limited	0.004	0.211
28	Union Finance Company Limited	-0.001	-1.585

The parameters of the market model have been estimated over a window period of -91 to -21 days before the event day by regressing the stock returns over the market returns. Thus, a maximum of 70 daily observations could be obtained for each of the sample company as well as for the market indexes. The alpha (α) and beta (β) of each sampled stock is exhibited in Table 2.2.

(f) Compute 'abnormal returns' for the window period for selected enterprises

The next step to be followed is to compute the abnormal returns for each of the sample companies for the window period. Abnormal return is defined as the actual return minus the expected return. The abnormal return for company 'i' on day't' is calculated as:

$$AR_{it} = R_{it} - E(R_{it} \mid X_t), \text{ or}$$

$$AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt}$$

Where AR_{it}, R_{it} and E (R_{it}) are the abnormal, actual and normal returns respectively for time period 't'. 'X_t' is the conditioning information for the normal return model.

There are two common choices for modeling the normal return – the constant mean return model where 'X_t' is a constant, and the market model where 'X_t' is the market return. The constant mean return model, as the name implies, assumes that the mean return of a given security is constant through time. The market model assumes a stable linear relation between the market return and the security return.

(g) Compute average abnormal returns (AAR) for each day in the event window period

It is to be remembered that normally the average effect of the announcement looked at rather than examining each company separately because other events are occurring and averaging across all companies should minimize the effect of these other events, thereby allowing a better examination of the event under study. Therefore, one should compute the average abnormal return on event day 't' (AAR_t) by dividing the aggregate abnormal returns for all securities on day't' by 'N', which is the sample size.

$$AAR_t = \sum_{i=1}^{N} AR_{it} \Big/ N$$

(h) Compute cumulative average abnormal return (CAAR)

For computation of cumulative average abnormal return, the individual day's average abnormal return (AAR) is added together from the beginning of the period to some specified period and is tested for significance.

Note that the study has used 41 days as event window period. Therefore, for the 41-day period (20 days before the event day and 20 days after), for instance, the entry for –10 would be the sum of daily average abnormal returns for days –20 to –10 and the entry for –1 would be the sum of the average daily abnormal returns for –20 to –1.

The cumulative average abnormal returns for event days 't_1' through 't_2' has been calculated by summing the average abnormal returns for these days:

$$CAAR = \sum_{t=t_1}^{t_2} AAR_t$$

The study has used several periods for computing and testing CAAR.

(i) Testing procedure

In event studies, null hypothesis are generally stated, as "the event has no significant impact on abnormal events over the event window." In an efficient market, abnormal returns should have expected value of zero. For testing whether the average abnormal returns over the event window period are significantly different from zero or not the following procedure has been used for testing the null hypothesis:

Step 1: Following Dhatt *et al.* (1994) the standard deviation of abnormal returns (residuals) for the estimation period for –91 days to –21 days has been computed for each sample company for the event window period. The standard deviation of abnormal returns for the estimation period for each sample company is presented in Table 2.3.

Step 2: Next, the standardized abnormal returns (SAR) for each company have been obtained by dividing abnormal returns of the event period (i.e. –20, -19, ….-1, 0, +1, +2,……+20) by the standard deviation obtained in step one.

Step 3: For event day 't', the t-statistic for the average abnormal return (AAR) on 'N' securities has been calculated as:

$$t_t = \sum_{i=1}^{N} SAR_{it} \Big/ \sigma / \sqrt{N}$$

Step 4: For testing cumulative average abnormal returns for 'N' securities over 'T' days (event days 't_1' through 't_2') the t-statistic has been computed as:

$$t_t = \sum_{t=1}^{t=2} SAR_{it} \Big/ \sigma / \sqrt{T * N}$$

The t-statistic used for testing the significance for the abnormal returns has been described by Dodd and Warner (1983).

For large samples, standardized abnormal returns and t-statistics are distributed as N(0,1). The primary advantage of using this particular test statistic is the specific adjustment it makes for differences in the variance of market returns between the parameter estimation and event periods. In addition, it provides a convenient method for testing cumulative average abnormal returns.

Table 2.3

Standard deviation of unstandardized residuals (abnormal returns)

S.N.	Name of the Company	Standard Deviation
1	Ace Finance Company Limited	0.044
2	Bank of Kathmandu Limited	0.016
3	Bank of Kathmandu Limited	0.014
4	Citizen Investment Trust	0.020
5	Everest Bank Limited	0.013
6	Himalayan Bank Limited	0.028
7	Kathmandu Finance Limited	0.039
8	Nabil Bank Limited	0.011
9	Nabil Bank Limited	0.009

10	Nepal Bangladesh Bank Limited	0.022
11	NIDC Capital Market Limited	0.043
12	National Finance Company Limited	0.035
13	Nepal Finance and Savings Company Limited	0.040
14	Nepal Housing Development Finance Limited	0.033
15	Nepal Housing Development Finance Limited	0.032
16	Nepal Investment Bank Limited	0.016
17	Nepal Investment Bank Limited	0.010
18	Nepal Merchant Bank and Finance Limited	0.017
19	Peoples Finance Limited	0.146
20	Nepal SBI Bank Limited	0.016
21	Nepal SBI Bank Limited	0.009
22	Standard Chartered Bank Nepal Limited	0.010
23	Standard Chartered Bank Nepal Limited	0.014
24	Universal Finance and Capital Market Limited	0.038
25	United Insurance Company Limited	0.021
26	United Insurance Company Limited	0.021
27	Uniliver Nepal Limited	0.023
28	Union Finance Company Limited	0.032

2.4 Analysis of data

This section provides empirical results of the information content of the dividend announcement in Nepalese stock market. The analysis contains announcement effect of overall sample as well as stock market reaction before and after the implementation of capital gain tax rate in 2001. Further, market response of large dividend announcement and small dividend has been analysed to provide a disaggregated view to test semi-strong form of market efficiency in Nepal.

(a) Overall Sample

The results relating to announcement effect of cash dividend declaration on equity shares are now presented and discussed. Table 2.4 gives the average abnormal returns (AARs) and the cumulative average abnormal returns (CAARs) for the window period in respect of all the 28 cash dividend announcements. The corresponding graphic representation for AARs and CAARs are given in Figures 2.1 and 2.2 respectively. The distribution of abnormal returns for the sample companies for the window period (41 days) has been presented in Appendix- 16 to Appendix -19.

Findings reported in Table 2.4 show that average abnormal return on the day of dividend announcement is 1.1 percent, which is not statistically significant. This implies that there is not any surprise disseminated by the announcement in stock market. This could be due to the fact that the information of dividend announcment often leaks out by the company to the market much earlier than the event window period. Hence, the announcement of dividend carries no surprise to the market.

In an efficient market, one would normally expect an abnormal return on the day of the announcement (t = 0) of cash dividend declaration, but not on other days. However, some abnormal returns have also been supported on the date surrounding the announcement day. In general, abnormal returns after the announcement is either due to information taking time is reflected in share prices or the announcement taking place so late in day zero, possibly even after the closure of the markets that its effect can only be reflected in prices on the day following the announcement.

A perusal of Table 2.4 also reveals that the AARs before the announcement day (-20 to –1 day) are positive for 12 days out of 20 days and negative for 8 days. However, all these returns are not statistically significant at one, five and ten percent level. Interestingly, though insignificant, AARs for –1 to –6 days before the announcement day are all positive.

Looking over the descriptive statistics of the average abnormal returns during the event window period, the mean return recorded as 0.03 percent and maximum and minimum returns are 1.1 percent and –1.7 percent which are on announcement day and 9 days after the announcement. On an average, the AARs vary 0.69 percent during the event window.

Table 2.4

Cash dividend announcement effect

Abnormal returns and cumulative abnormal returns (overall sample)

This table reports the average abnormal returns (AARs) and cumulative average abnormal returns (CAARs) with their respective t-values for overall sample (28) cash dividends announcements of NEPSE listed enterprises occurring during 1996-2005. AARs are estimated using market model parameters estimated over days –91 to –21 relative to day 0, the cash dividend announcement date. Day 0 is the Board of Directors meetings date that makes decision to declare the dividend. Fourty-one days return prediction errors are measured from day –20 to +20. The t-statistic for each day is computed using the standardized abnormal returns for event window period. The tabulated t-values at 1, 5 and 10 percent level for 27 d.f. (Two-tailed test) are 2.771, 2.052 and 1.703 respectively.

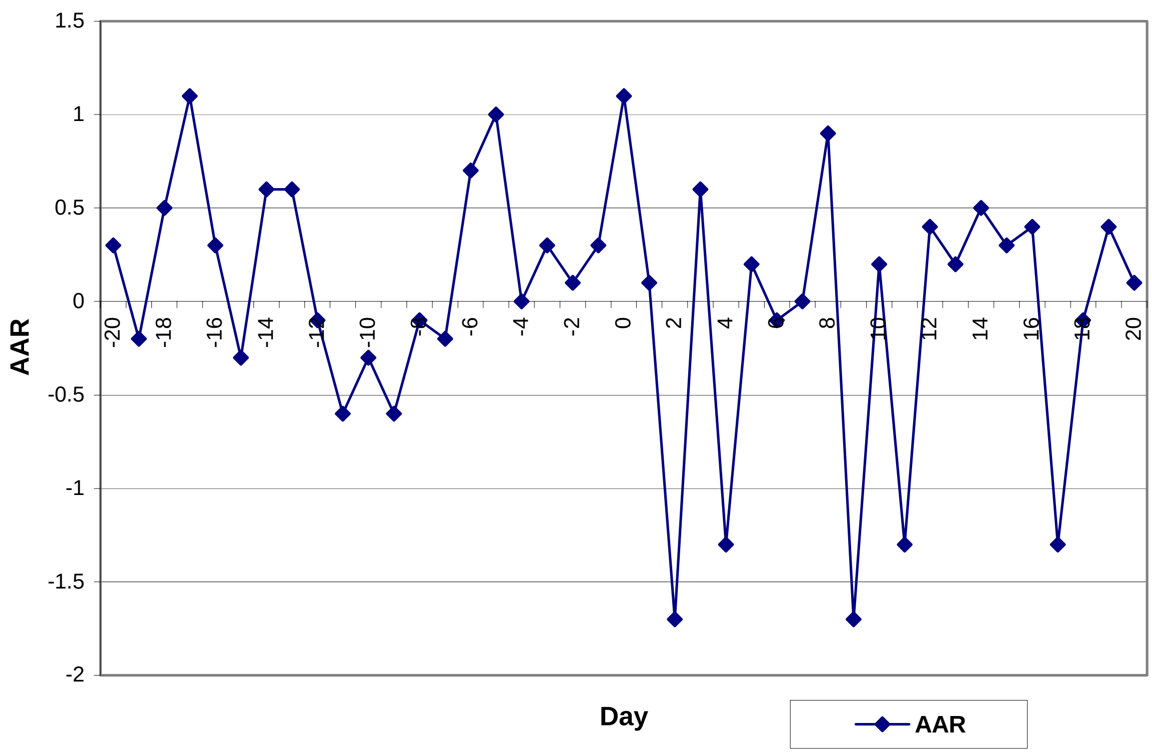
S.N.	Days relative to AD	AAR (%)	t-statistic	CAAR (%)	t-statistic
1	-20	0.3	0.39	0.3	0.39
2	-19	-0.2	-0.23	0.1	0.18
3	-18	0.5	0.25	0.6	0.16
4	-17	1.1	1.38	1.7*	3.26
5	-16	0.3	-0.36	1.9	1.41
6	-15	-0.3	-0.80	1.6*	-3.86
7	-14	0.6	1.35	2.3***	2.12
8	-13	0.6	0.13	2.9*	4.14
9	-12	-0.1	0.33	2.8	1.30

10	-11	0.6	0.47	3.3*	2.90
11	-10	-0.3	-1.14	3.0	-1.48
12	-9	-0.6	-0.76	2.4*	-5.15
13	-8	-0.1	0.32	2.4**	-1.96
14	-7	-0.2	-0.63	2.1	-1.56
15	-6	-0.7	-0.86	1.4*	-5.27
16	-5	1.0	1.32	2.4	-0.17
17	-4	0.0	0.53	2.4*	11.42
18	-3	0.3	0.44	2.7*	3.38
19	-2	0.1	0.42	2.8*	3.95
20	-1	0.3	0.07	3.1	1.56
21	0	1.1	1.66	4.2*	8.0
22	+1	0.1	-0.31	4.3*	4.51
23	+2	-1.7	-0.51	2.6*	-3.18
24	+3	0.6	0.60	3.2*	-3.11
25	+4	-1.3	-1.37	2.0*	-4.12
26	+5	0.2	-0.72	2.1*	-8.73
27	+6	-0.1	-0.49	2.0*	-9.60
28	+7	0.0	0.21	2.0*	-0.84
29	+8	0.9***	1.82	3.0*	11.37
30	+9	-1.7	-1.37	1.3*	-2.95
31	+10	0.2	0.72	1.5*	-16.42
32	+11	-1.3***	1.88	0.2*	-7.99
33	+12	0.4	1.19	0.6*	-3.52
34	+13	0.2	0.51	0.8*	15.16
35	+14	0.5	0.73	1.4*	6.73
36	+15	0.3	0.74	1.6*	8.06
37	+16	0.4	0.95	2.0*	10.19
38	+17	-1.3***	-1.83	0.7*	-6.26
39	+18	-0.1	-0.42	0.6*	-13.18
40	+19	0.4	0.35	1.1	-0.09
41	+20	0.1	-0.08	1.1*	3.38

* Significant at 1 percent level.
** Significant at 5 percent level.
*** Significant at 10 percent level.

In a semi-strong efficient market one would expect that the effect of release of information on share prices would take place much before the actual announcement rather than after the release of information regarding cash dividends distribution. Surprisingly, on the day of the event no significant abnormal return has been found thereby indicating that the market has already anticipated the announcement of cash dividend and may have reacted much earlier than on the day of announcement. After the announcement day abnormal returns are negative for 7 days and positive for 13 days. Three of them are significant (day +8, +11 and +17). Interestingly, two of these are negative. The negative and significant abnormal returns after the announcement may be interpreted as a correction made by the market which it might have over reacted earlier than the announcement.

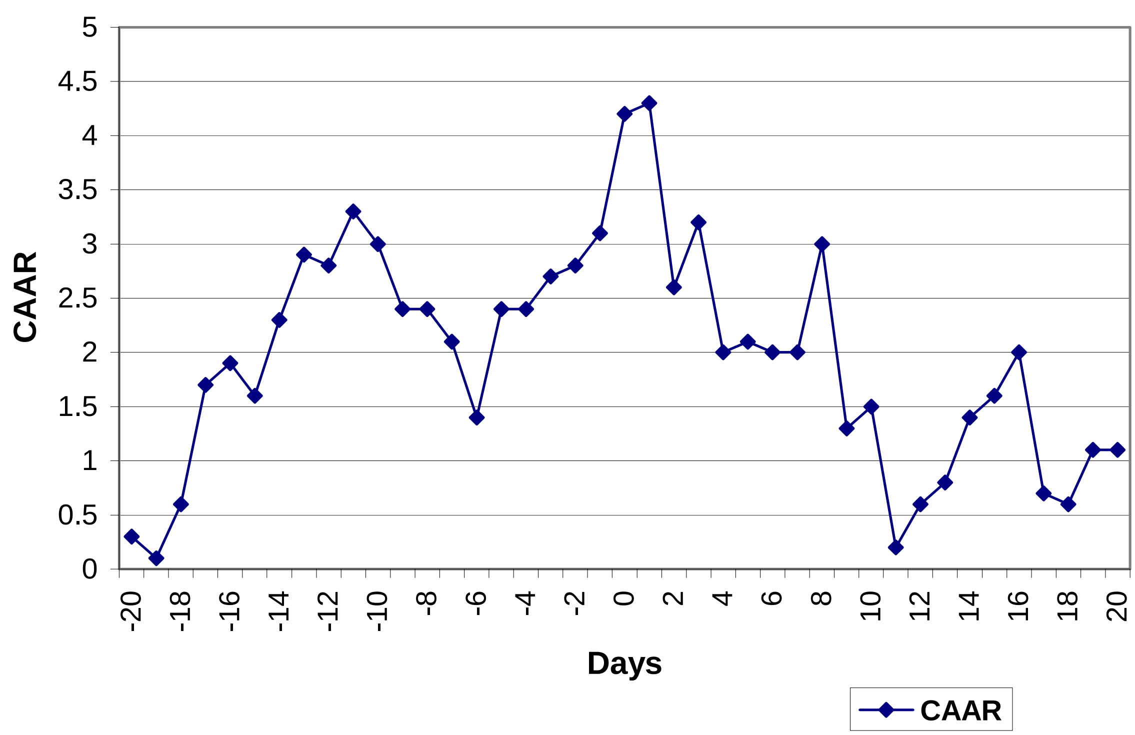
Figure 2.1: Average abnormal returns-overall sample



Overall, abnormal returns are statistically insignificant in all trading days prior to the event and 17 trading days after the event signify that there is no information leakage or delay in market reaction to cash dividend announcements. AAR results suggest that the effect of dividend announcement is not strong in Nepal Stock Exchange. Shareholders gain only about 1 percent value about four/five days before the announcement of dividend but no significant value gain on the announcement day.

As regards to the CAAR, it is assumed that it should be zero before the announcement day and then shift to a positive level right after the event and remains at that level in an efficient market. Results in Table 2.4 shows that CAAR had risen from 0.3 percent on day –20 to a level of 4.20 percent on the day of dividend announcement. The significant CAAR on the day of event indicates that the investors gain value from dividend announcement. But the gained value is lost over the next 20 days after dividend announcement, as CAAR dropped to 1.1 percent on the day +20. The continuous increase in the CAAR even after the event day (CAAR reached 1.43 percent on day +1) suggests that investors may have over reacted to the dividend announcement. Later, they corrected the over reaction to some extent. Out of 20 trading days before the announcement, 11 CAARs are significant and all the CAARs after the announcement are significant except one on day +19.

Figure 2.2: Cummulative average abnormal returns-overall sample



Findings also show that investors gain more value (3.9 percent) in the pre-dividend period than the value lost (3.1 percent) in the ex-dividend period. This finding tends to suggest that dividend announcement carries information about the future earnings and cash flow of the enterprises. In Nepal, most of the dividends paying enterprises are commercial banks, finance companies, insurance companies and some development banks. All these banks and financial institutions are under pressure from their respective regulatory bodies to increase their capital base. Besides, NEPSE generally rates performance of the listed companies based on their regular dividend payments. Although a standard free cash flow/over investment explanation is less likely to directly apply in the Nepalese setting due to concentrated ownership structures, the positive reaction is also consistent with a reduction in potential exploitation of smaller shareholders by larger ones. Moreover, the investors seemed to gain some value from dividend announcement, the evidence is not consistent with the dividend irrelevance hypothesis of Miller and Modigliani (1961). Further, the significant CAAR on the day of event and after the announcement day do not support the semi-strong form efficient market hypothesis.

In an academic literature, it was suggested that dividend payments have no impact on the shareholder's value (Miller and Modigliani, 1961) in the absence of taxes and other market imperfections. A dividend payment provides cash flow to the shareholders but it reduces firm's resources for investment. Hence, firms should not pay dividends if they have any positive net present value project in hand. However, Walter (1956) and Gordon (1959 and 1962) showed that valuation of stock depends on the expected future dividends. If company pays out all the earnings to shareholders, funds for future investment will decrease and dividend may not increase in the future. Therefore, theoretical literature suggested that dividends payout should not be desirable provided that companies can better invest their funds. Moreover, cash dividend is not desirable if investors need to pay taxes on their dividend income. Given the valid reasons for not paying dividends, an announcement of dividend payments may carry some information for the market and stock prices may be adjusted accordingly.

To conclude, in Nepal there are insignificant abnormal returns during the event window. Most positive AARs before and after the announcement also indicates that investors do have already anticipated and gained from the announcement. However, the significant CAARs on the event day and after do not support the semi-strong form efficient market hypothesis. The behaviors of AARs and CAARs, thus, are not consistent with the semi-strong form of EMH.

(b) Pre-and-post-2001 announcement of cash dividends

To enhance the analysis of the cash dividend announcement effect on stock prices, the samples are further classified into sub-periods: pre-2001 and post-2001 announcements. Actually, the rationale behind this is to investigate the absorption of informational content of dividends by the Nepalese stock market after the effective implementation of capital gain tax. In Nepal, capital gain tax has been effective from July 17, 2001. Dividing subgroups in pre-2001, thus means the announcements before 17^{th} July 2001 and post –2001 means after 17^{th} July 2001. There are, thus, 12 cases for pre-2001 and 16 cases for post-2001. The daily average returns (AARs) and cumulative daily average returns (CAARs) realized by stockholders in the 41 days surrounding the dividend announcement dates for sub-periods are presented in panel A and B of Table 2.5. The t-statistics presented indicate whether the AAR and CAAR are significantly different from zero. Finally, the AAR and CAAR plotted in Figures 2.3 and 2.4 provide an overview of the results.

Results in panel A of Table 2.5 indicate that the average abnormal return on event day is 2.0 percent which is not statistically significant. As in overall sample results, all the AARs are insignificant during the pre-2001 period. There are 11 positive and 9 negative AARs before the announcement date and exactly same patterns have been observed after that date. This indicates that information leakage within the event window period is not a problem in Nepalese stock market and investors earn normal returns during the period. The large number of positive abnormal returns even after the announcement date also reveals the relevancy of the dividend information in the market.

Table 2.5
Cash dividend announcements effect

Panel A of this table reports the average abnormal returns (AARs) and cumulative average abnormal returns (CAARs) with their respective t-values for sub-sample (12) cash dividends announcements of NEPSE listed firms occurring during 1996-2001. Panel B describes the distribution of AARs and CAARs for sub-sample (16) cash dividend announcements of NEPSE listed firms occurring during 2001-2005.For each variable in panel A and B, AARs are estimated using market model parameters estimated over days –91 to –21 relative to day 0, the cash dividend announcement date. Day 0 is the Board of Directors meetings date that makes decision to declare the dividend. Forty one days return prediction errors are measured from day –20 to +20. The t-statistic for each day is computed using the standardized abnormal returns for event window period. The tabulated t-values at 1, 5 and 10 percent level for 11 d.f. (two-tailed test) are 3.106, 2.201 and 1.796 respectively. The tabulated t-values at 1, 5 and 10 percent level for 15 d.f. (two-tailed test) are 2.947, 2.131 and 1.753 respectively.

Panel A
Abnormal returns and cumulative abnormal returns (Pre-2001)

S.N.	Days relative to AD	AAR	t-statistic	CAAR	t-statistic
1	-20	0.90	0.21	0.9**	2.51
2	-19	-0.8	-0.19	0.1	0.37
3	-18	1.5	0.11	1.6**	2.48
4	-17	1.9	0.14	3.5*	6.05
5	-16	-0.8	-0.05	2.7*	4.48
6	-15	-1.0	-0.18	1.7*	8.79
7	-14	0.0	-0.00	1.6*	4.85
8	-13	0.6	0.06	2.2*	8.07
9	-12	-0.6	-0.09	1.6*	8.37
10	-11	0.4	0.04	2.0*	7.90
11	-10	-0.8	-0.13	1.2*	7.89
12	-9	0.1	0.01	1.3*	6.02
13	-8	0.9	0.09	2.2*	10.33
14	-7	-0.5	-0.03	1.7*	5.03
15	-6	-2.3	-0.10	-0.6	-1.25
16	-5	1.1	0.09	0.5***	1.98
17	-4	0.6	0.08	1.0*	7.60
18	-3	0.5	0.05	1.5*	7.98
19	-2	-0.2	-0.03	1.3*	7.26
20	-1	0.3	0.02	1.6*	5.45
21	0	2.0	0.22	3.6*	22.00
22	+1	-0.6	-0.03	3.0*	8.21
23	+2	1.5	0.15	4.5*	27.58
24	+3	1.1	0.08	5.6*	25.30
25	+4	-1.5	-0.06	4.0*	9.86
26	+5	0.4	0.02	4.5*	13.26
27	+6	0.4	0.03	4.9*	24.46
28	+7	-0.4	-0.02	4.5*	15.70
29	+8	1.3	0.12	5.8*	36.15
30	+9	-1.3	-0.08	4.5*	16.28
31	+10	0.4	0.05	4.9*	47.20
32	+11	-0.9	-0.06	4.0*	19.32
33	+12	0.9	0.08	4.9*	31.66
34	+13	-0.4	-0.04	4.5*	32.19
35	+14	-0.2	-0.02	4.2*	22.19
36	+15	1.2	0.13	5.4*	4514
37	+16	0.2	0.02	5.6*	36.44
38	+17	-1.4	-0.12	4.2*	26.39

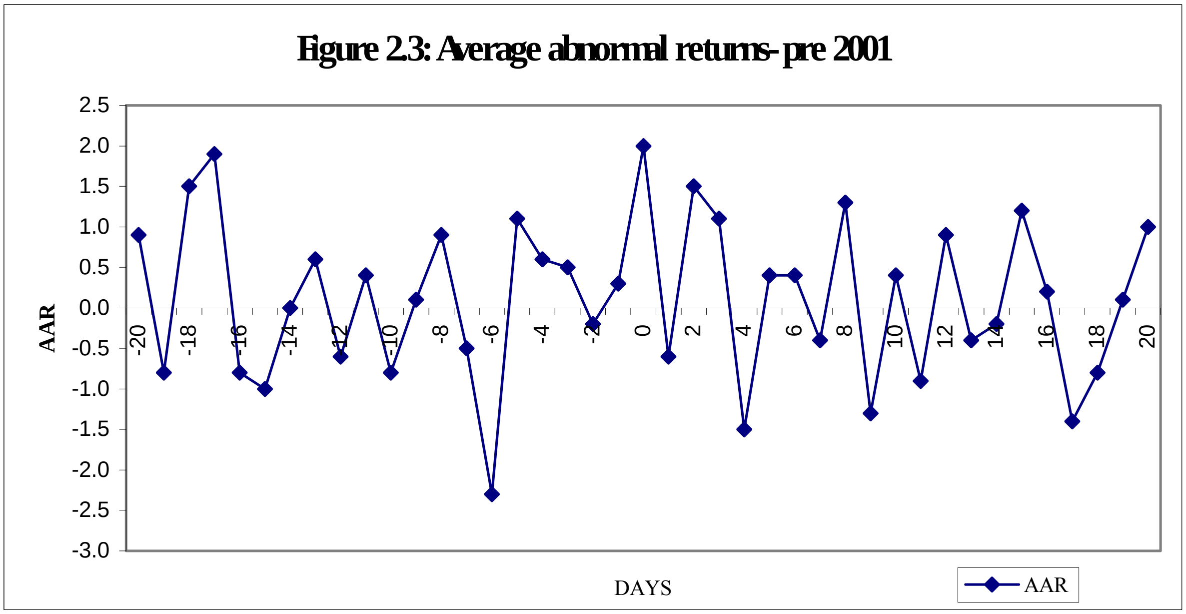
39	+18	-0.8	0.09	3.3*	28.14
40	+19	0.1	0.01	3.4*	28.59
41	+20	1.0	0.11	4.4*	37.32

Panel B
Abnormal returns and cumulative abnormal returns (Post-2001)

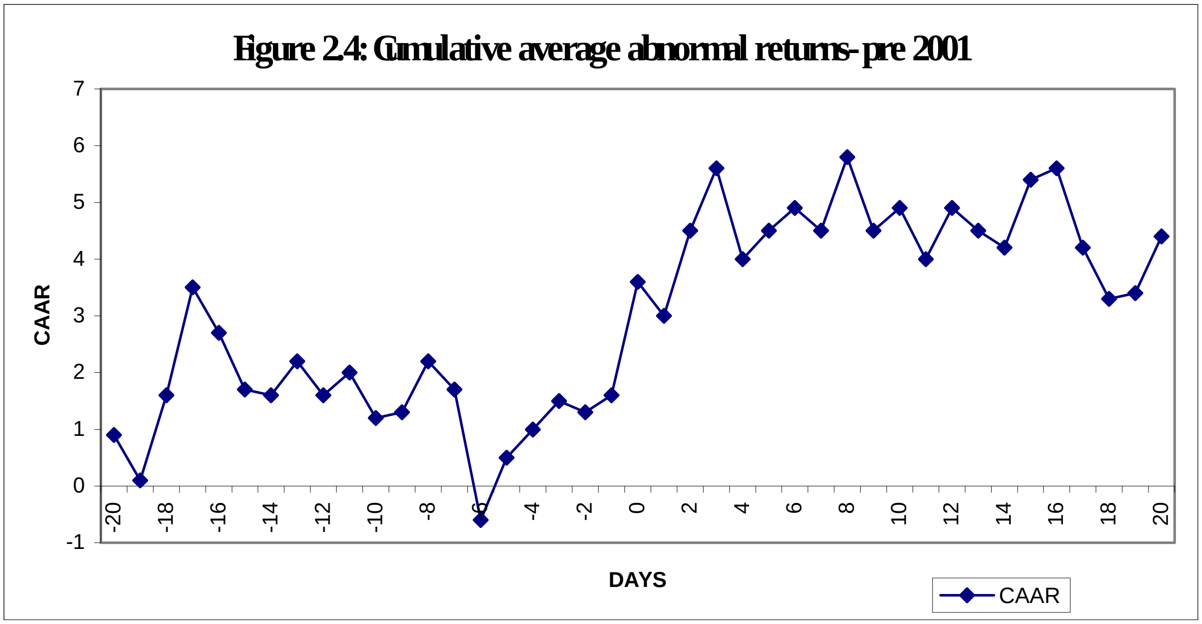
S.N.	Days relative to AD	AAR	t-statistic	CAAR	t-statistic
1	-20	-0.2	-0.06	-0.2	-0.95
2	-19	0.3	0.04	0.1	-0.26
3	-18	-0.3	-0.05	-0.2***	-1.75
4	-17	0.5	0.00	0.3**	-2.70
5	-16	1.1	0.01	1.4***	-1.72
6	-15	0.2	0.02	1.6**	-2.27
7	-14	1.1	0.17	2.8*	3.43
8	-13	0.6	0.03	3.4*	3.79
9	-12	0.3	0.04	3.7*	3.88
10	-11	0.6	0.03	4.3*	8.77
11	-10	0.1	-0.02	4.4*	10.59
12	-9	-1.1	-0.09	3.3*	5.52
13	-8	-0.8	-0.11	2.5*	1.02
14	-7	0.0	-0.01	2.4*	0.34
15	-6	0.5	0.09	2.9*	6.25
16	-5	0.9	0.12	3.8*	15.25
17	-4	-0.5	-0.05	3.3*	14.55
18	-3	0.2	0.02	3.5*	9.26
19	-2	0.4	0.06	3.9*	13.72
20	-1	0.2	0.06	4.2*	19.06
21	0	0.4	0.00	4.6*	16.01
22	+1	0.6	0.01	5.2*	14.24
23	+2	-4.1	-0.06	1.2*	0.14
24	+3	0.3	0.03	1.4*	2.90
25	+4	-1.0	-0.10	0.4*	-5.23
26	+5	0.0	-0.04	0.4*	-5.98
27	+6	-0.5	-0.03	-0.1*	-14.67
28	+7	0.3	0.03	0.2*	-13.35
29	+8	0.7	0.05	0.9*	-9.36
30	+9	-2.0	-0.09	-1.2*	-10.48
31	+10	0.1	0.01	-1.0*	-31.26
32	+11	-1.6	-0.19	2.6*	-44.82
33	+12	0.1	0.06	-2.5*	-24.48
34	+13	0.6	0.16	-1.9*	-113.97
35	+14	1.1	0.18	-0.8*	-66.34
36	+15	-0.4	-0.05	-1.2*	-36.50
37	+16	0.6	0.07	-0.6*	-23.47
38	+17	-1.2	-0.06	-1.8*	-22.05
39	+18	0.5	0.06	-1.4*	-26.25
40	+19	0.7	0.14	-0.7*	-38.35
41	+20	-0.7	-0.11	-1.4*	-38.73

* Significant at 1 percent level

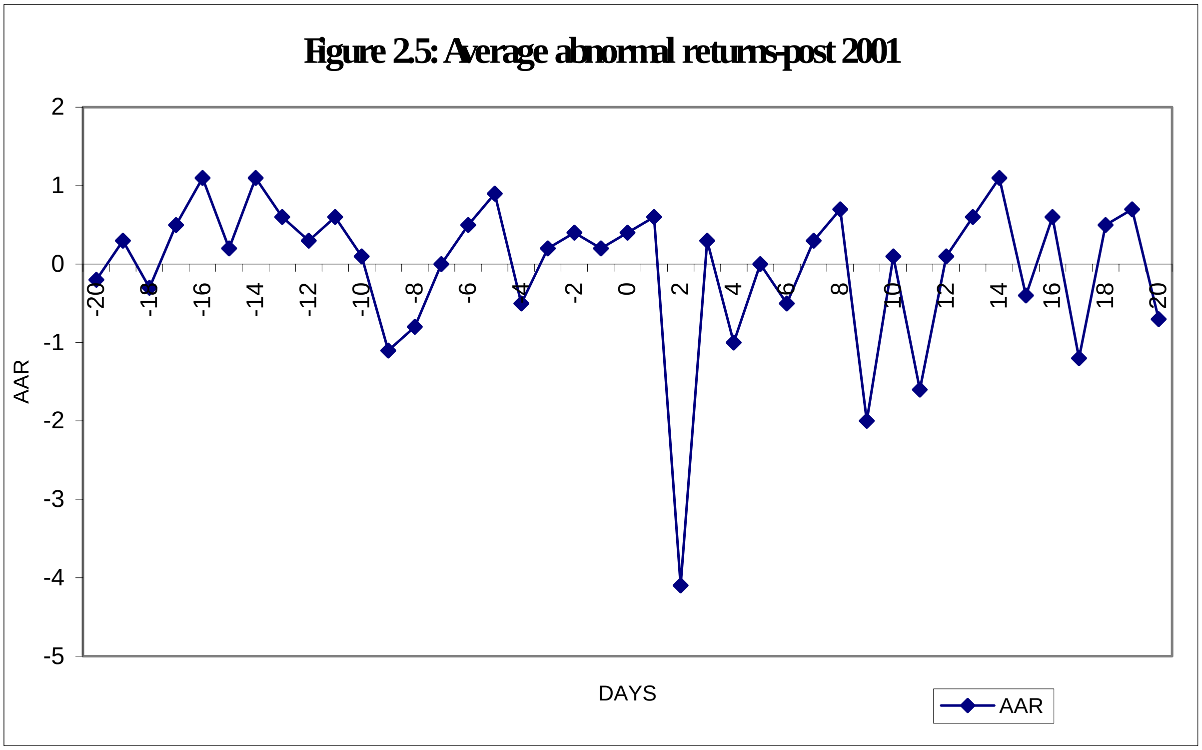
** Significant at 5 percent level
*** Significant at 10 percent level



The CAAR, on the other hand, begins with 0.9 percent in 20 days earlier the event date and reached to 3.6 percent on the event date. It further increases and reaches to 5.8 percent in post announcement period. Finally, it drops to 4.4 percent indicating that investors gain significantly from the announcement. Interestingly, all the CAARs after the announcement are significant. The descriptive statistics of AAR shows the mean return of 0.11 percent, maximum of 2.0 percent and minimum of –2.3 percent during the event window period. Similarly, during the 41-day event window period the CAAR reaches its maximum to 5.8 percent and drops to minimum of –0.6 percent with the mean return of 3.0 percent. Both AAR and CAAR vary with the standard deviation of 0.98 percent and 1.7 percent respectively.

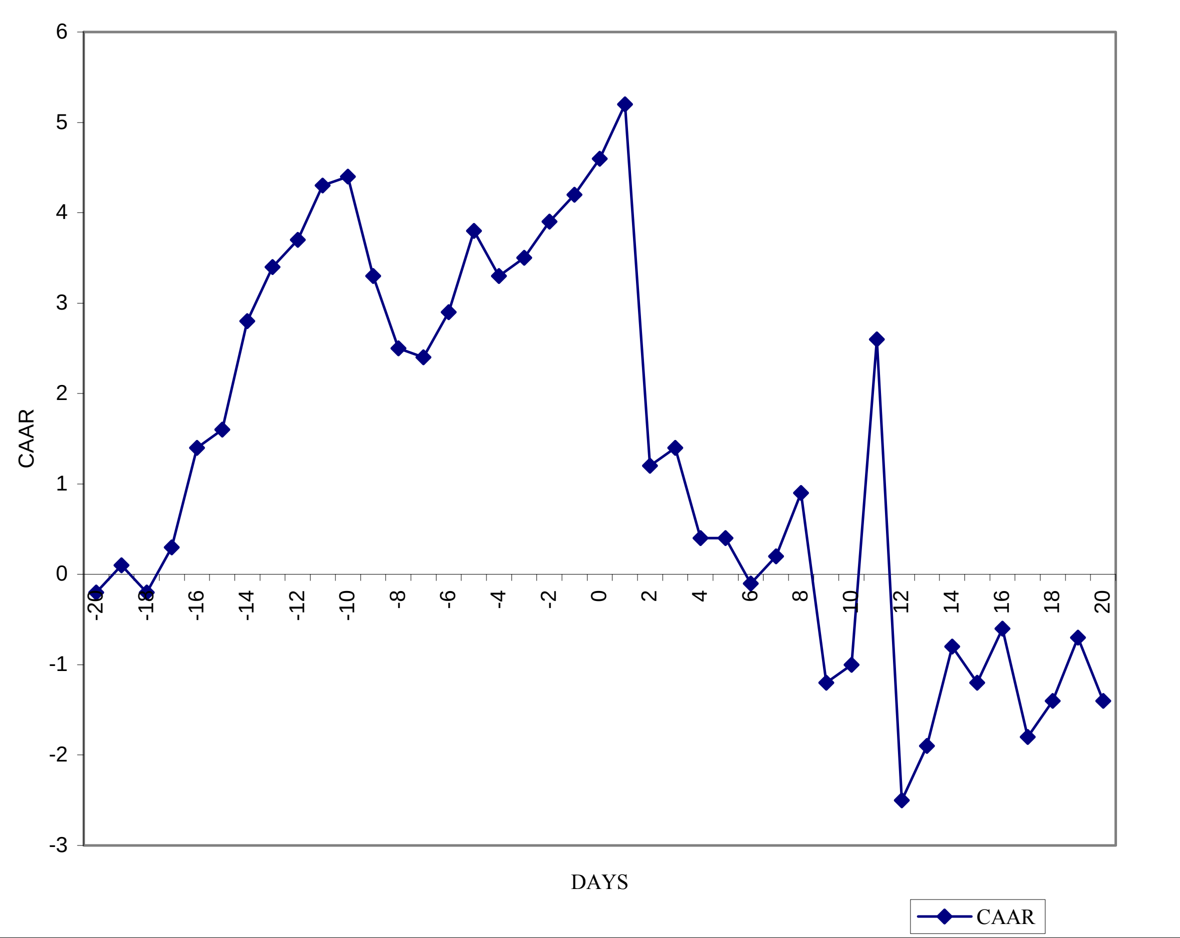


Panel B of the Table 2.5 reports the AARs and CAARs of the sub-period post 2001. The AAR on day of announcement for the period is 0.4 percent. Confirming to the other findings of overall sample and pre-2001 period, all the ARRs for this sub-period are also insignificant. There are 15 positive and 5 negative AARs before the announcement period and 8 negative AARs after the announcement. CAAR, on the other hand, on event day is 4.6 percent and continues to rise to the level of 5.2 percent possibly due to the delay in the dissemination of the information during the period. One day after the announcement, CAAR continues to drop and lost the value initially gained to the level of -1.4 percent. This indicates that the investors in totality do not gain from the announcement of cash dividend. The low value of AAR on the announcement day and the trend of CAAR during the event window indicate improved level of efficiency in sub-period post-2001. Moreover, the mean AARs for event window between the two sub-periods (pre-and-post-2001) are not significantly different. Contrary to the findings of AAR, mean CAAR for both the sub-periods are significantly different.



To sum, the analysis of the AARs and CAARs for the two sub-periods show that Nepalese stock market improves the level of efficiency in the post–2001. The significant CAARs during the periods, however, suggest that that market is not sufficiently efficient to reflect the information in the stock price. The results, thus, support that Nepalese stock market is not semi-strong form efficient in both the sub-periods.

Figure 2.6: Cummulative average annual returns-post 2001



The study further analyses that whether the large dividend announcement carries more information in the stock market by classifying the overall samples into two sub-groups.

(c) Large and small dividend announcements effect

Overall samples are divided into two groups: large payment ratio of cash dividend and small payment ratio. In Nepal, dividend payment announcements are expressed in percent of paid-up capital. Based on the samples, two sub-groups are constructed: one represents dividend payment ratio of 20 percent and above (large payment ratio) and another below 20 percent (small payment ratio). Analyzing the impact of payment ratio in stock price behavior further reveals the level of market efficiency in Nepalese stock market by adjusting the dividend information. With this classification, equal numbers of samples for both sub-groups are availed. Pane A and B of the Table 2.6 presents AARs and CAARs with their statistical significance. Figures 2.5 and 2.6 depict an overview of the results.

Table 2.6

Cash dividend announcements effect

Panel A of this table reports the average abnormal returns (AARs) and cumulative average abnormal returns (CAARs) with their respective t-values for sub-sample (14) cash dividends announcements of NEPSE listed firms occurring during 1996-2005 those have the dividend payment ratio (dividend/paid-up capital) of 20 percent or more. Panel B describes the distribution of AARs and CAARs for sub-sample (14) cash dividend announcements of NEPSE listed firms occurring during 1996-2005 those distribute dividends of less than 20 percent. For each variable in panel A and B, AARs are estimated using market model parameters estimated over days –91 to –21 relative to day 0, the cash dividend announcement date. Day 0 is the Board of Directors meetings date that makes decision to declare the dividend. Forty one days return prediction errors are measured from day –20 to +20. The t-statistic for each day is computed using the standardized abnormal returns for event window period. The tabulated t-values at 1, 5 and 10 percent level for 13 d.f. (two-tailed test) are 3.012, 2.160 and 1.771 respectively.

Panel A

Abnormal returns and cumulative abnormal returns (large dividends)

S.N.	Days relative to AD	AAR	t-statistic	CAAR	t-statistic
1	-20	0.2	0.20	0.2	0.20
2	-19	-0.2	-0.40	0.0	-0.30
3	-18	0.4	0.91	0.4	1.15
4	-17	1.4	1.49	1.9*	3.73
5	-16	-0.2	-0.27	1.7**	2.15
6	-15	-0.7***	-1.86	1.0*	3.57
7	-14	0.7***	2.09	1.7*	7.69
8	-13	0.6	-0.11	2.3*	5.45
9	-12	-0.7	-0.67	1.6*	6.32
10	-11	0.2	-0.12	1.7*	5.56
11	-10	-1.1**	-2.29	0.7	0.49
12	-9	-0.6	-0.87	0.1*	-2.68
13	-8	-0.1	0.15	0.0*	-3.25
14	-7	-0.8	-0.62	-0.8*	-3.84
15	-6	-0.2	-0.55	-0.9*	-11.06
16	-5	0.3	0.10	-0.7*	-6.11
17	-4	-0.2	-0.39	-0.8*	-30.27
18	-3	-0.2	-0.75	-1.0*	-14.93
19	-2	-0.8**	-2.01	-1.8*	-29.58
20	-1	0.2	-0.07	-1.6*	-23.06
21	0	1.0	0.93	-0.6*	-10.69
22	+1	0.9	0.52	0.3*	-6.30
23	+2	1.6***	1.80	1.9**	1.97
24	+3	0.0	-0.62	1.9	-0.44
25	+4	-1.9	-1.46	0.0*	-7.66
26	+5	0.5	-0.53	0.5*	-7.72
27	+6	0.3	-0.21	0.8*	-20.17
28	+7	-0.3	-0.11	0.5*	-15.89
29	+8	0.9	0.94	1.4*	-12.61
30	+9	-2.2	0.94	-0.8*	-10.55
31	+10	0.2	0.69	-0.7*	-35.29
32	+11	-0.3	-0.38	-1.0*	-22.61
33	+12	0.9	1.45	-0.1*	-14.01
34	+13	-0.5	-0.38	-0.7*	-22.59
35	+14	-0.3	-0.04	1.0*	-21.40
36	+15	0.8	1.08	-0.2*	-12.62
37	+16	-0.3	-0.21	-0.5*	-19.91
38	+17	-1.3***	-1.89	-1.8*	-27.51

39	+18	-0.3	-0.80	-2.1*	-25.64
40	+19	-0.1	-0.24	-2.2*	-18.29
41	+20	0.6	0.83	-1.5*	-34.04

Panel B

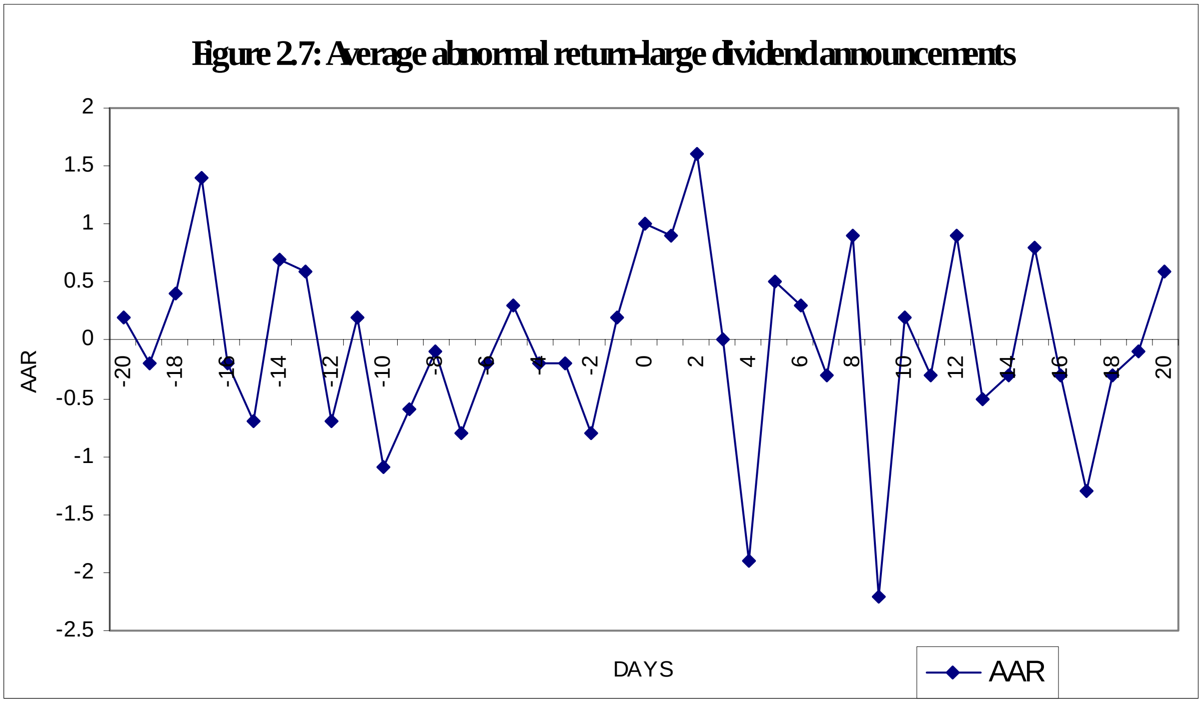
Abnormal returns and cumulative abnormal returns (small dividends)

S.N.	Days relative to AD	AAR	t-statistic	CAAR	t-statistic
1	-20	0.4	0.34	0.4	0.34
2	-19	-0.1	0.06	0.2	0.52
3	-18	0.5	-0.13	0.7	0.12
4	-17	0.8	0.43	1.5	1.04
5	-16	0.7	-0.24	2.2	0.39
6	-15	0.1	0.14	2.3	1.00
7	-14	0.6	0.10	2.9	1.09
8	-13	0.6	0.41	3.4**	2.79
9	-12	0.5	0.73	4.0*	3.69
10	-11	0.9	0.79	4.9*	9.13
11	-10	0.5	1.27	5.4*	24.41
12	-9	-0.7	-0.17	4.8*	10.94
13	-8	0	0.29	4.7*	12.01
14	-7	0.3	-0.16	5.0*	14.00
15	-6	-1.2	-0.72	3.8**	2.62
16	-5	1.6**	2.62	5.4*	19.22
17	-4	0.1	0.69	5.6*	19.44
18	-3	0.8	1.12	6.4*	21.22
19	-2	1.0***	1.80	7.4*	32.38
20	-1	0.3	0.11	7.7*	18.93
21	0	1.2	1.49	8.9*	42.53
22	+1	-0.7	-1.18	8.3*	27.58
23	+2	-5	-1.34	3.3*	3.22
24	+3	1.3	1.52	4.5*	17.73
25	+4	-0.6	-0.41	3.9*	14.83
26	+5	-0.1	-0.48	3.8*	10.46
27	+6	-0.6	-0.44	3.2*	12.49
28	+7	0.4	0.37	3.6*	11.97
29	+8	1.0***	1.94	4.6*	35.54
30	+9	-1.2	-1.32	3.4*	16.09
31	+10	0.3	0.33	3.6*	23.30
32	+11	-2.2**	-2.68	1.4*	4.14
33	+12	0.0	0.10	1.4*	4.41
34	+13	0.8*	3.60	2.2*	40.90
35	+14	1.4	1.36	3.6*	22.37
36	+15	-0.3	-0.16	3.3*	15.69

37	+16	1.1	1.26	4.5*	19.31
38	+17	-1.3	-0.89	3.2*	11.33
39	+18	0.1	0.22	3.3*	13.92
40	+19	1.0***	1.92	4.2**	41.07
41	+20	-0.5	1.21	3.7*	28.35

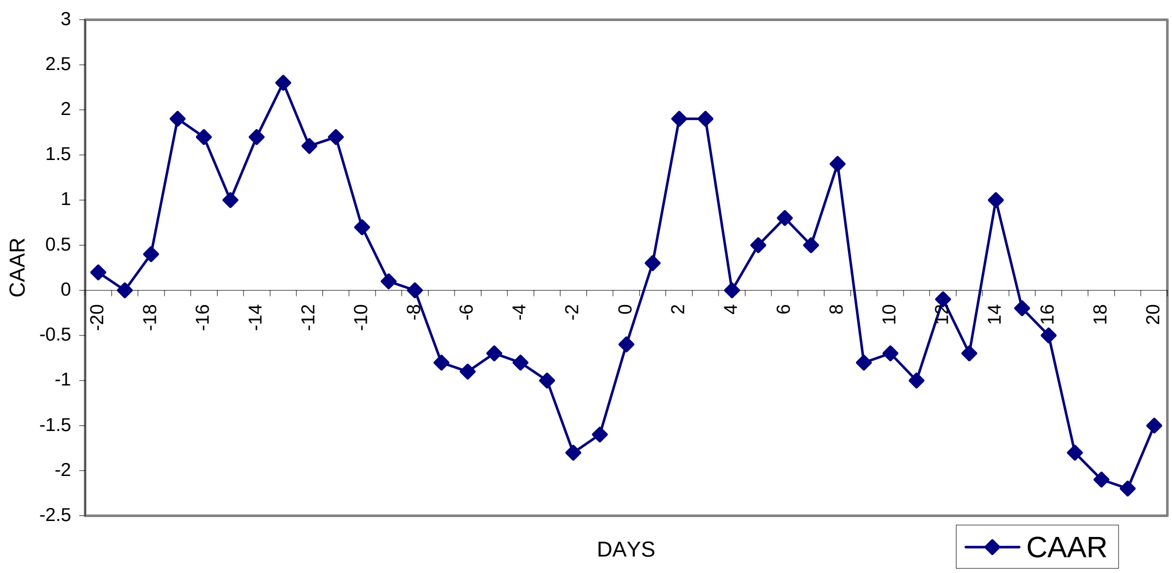
* Significant at 1 percent level, ** Significant at 5 percent level, *** Significant at 10 percent level

Focusing on the market model (or risk-adjusted) daily returns of panel A of Table 2.6 for large dividend payment ratio samples, it has been observed that the AAR on announcement day is 1.0 percent which is statistically insignificant. Unlike previous results, it is further observed that there are significant ARRs on 2, 14, and 15 days before the day of announcement and 2 and 17 days after the announcement. Surprisingly, 11 negative and 9 positive AARs before the event day and 10 positive and 10 negative AARs after the date are noticed. The significant 1.6 percent AAR on two-day ex-dividend tends to presume the possible delay on the leakage of information to the investor. This assumption is further supported by the negative and significant 0.8 percent AAR on day –2. The CAAR that is 0.2 percent at the beginning of the event window does not improve till announcement date and remain at –0.6 percent which is significant. Later, CAAR improves to 1.4 percent till 8 days after the announcement. Investors do not gain, however, from the announcement during the event window period as the CAAR drops to –1.5 percent at the outset of the event window.

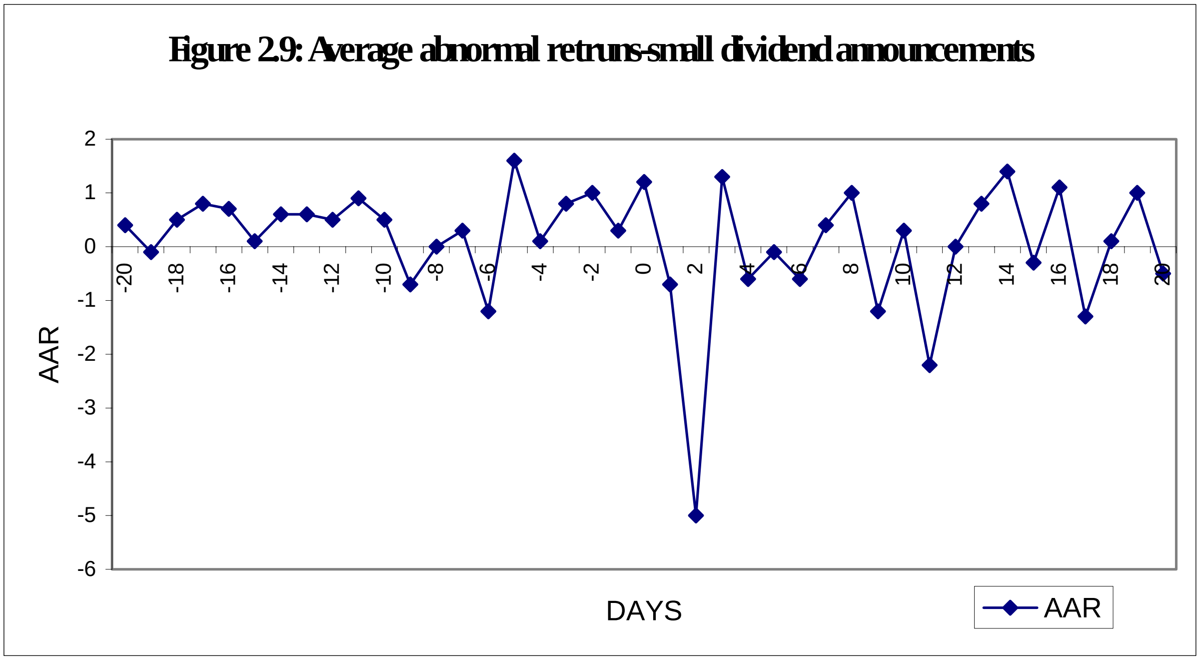


Note that the stocks included in the samples are mostly from the commercial banks. These stocks predominate the overall stock market in Nepal Stock Exchange. The delay reaction by the investor on dividend announcement may reveal that there is a communication gap between the listed companies and investors. Normally it happens that investors react too early (even before 3-4 months prior the announcement) from the observations of periodical financials of these institutions. This overreaction of the investors might not have been reflected in the event window period.

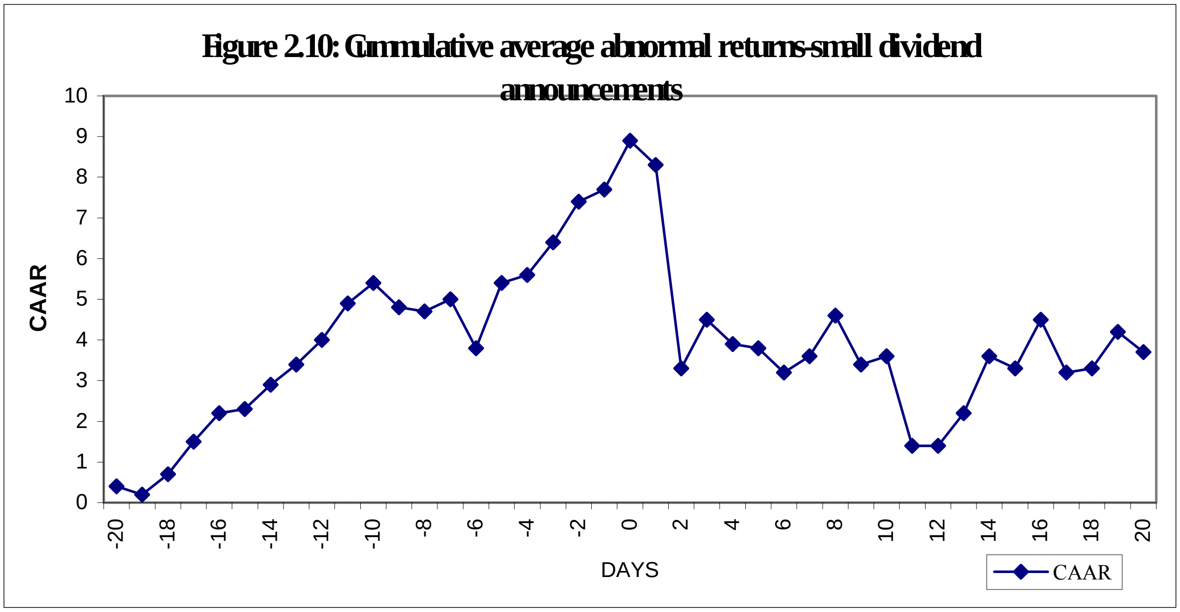
Figure 2.8: Cummulative average abnormal returns-large dividend announcemnt



Over the period starting 20 days prior to dividend announcement to 20 days after the announcement of dividend payment, investors incurred losses up to 1.5 percent of stock value. Although this loss of value is partially compensated by the current dividend yield, investors in Nepal seemed have no net gain due to dividend payments by these stocks. The evidence from this sub-group tends to support Miller-Modigliani hypothesis (1961) of dividend irrelevancy. However, the results do not support the presence of semi-strong form of market efficiency as it is assumed for the market to be efficient in semi-strong form that CAAR be zero on event date and be consistent after the event date.



Panel B of Table 2.6 further highlights the AAR and CAAR behavior of small dividend payment enterprises. For these enterprises, AAR reported on the day of announcement is 1.2 percent, higher and positive as compared to large payment ratio stocks. Contrary to the large samples, it has been observed that there is a positive and significant abnormal return on two to five days earlier from the day of announcement. The reported AARs are 1.0 percent and 1.6 percent. Unlike evidenced from results from previous samples, it has been noticed the that there are substantial number of positive AARs (17 out of 20) and only 3 negative AARs. The positive and significant AAR surrounding the event day tend to presume that early leakage of information or the over reaction by the investors. After the announcement date, it has been observed 10 negative and 10 positive AARs. Four significant AARs after the announcement of cash dividends in this sub-group are further noticed. Quiet interestingly, the 1.6 percent significant positive abnormal return observed 5-days prior to the event date has been later recognized by the market after 11 days with a loss of 2.2 percent. This may be the correction by the investors which they have been overreacted before the announcement.



Elton and Gruber (1996) have provided a possible explanation for the observed average abnormal returns before actual announcement of an event. The study argue," abnormal returns prior to the announcement day can come from three sources. First, the fact that an important announcement will take place is often released to the public prior to the announcement will take place and the way the release may convey information". Thus, the release of the message to analysts and financial press that there will be an important announcement at press conference may convey important information to them. If this is so, in an efficient market, this should be reflected in share prices much before the important announcement takes place.

The study further argue, "….. if the announcement at the discretion of the firm it may be partially caused by prior abnormal returns ……" In such a situation this type of announcement will show abnormal returns prior to the announcement day.

The third possible cause for abnormal returns before the announcement day could reflect leakage of information by those having access to it. In the Nepalese context, this possibility is quite high.

On the other hand, CAAR that was 0.8 percent at the beginning of the event window reaches to the maximum of 8.9 percent on the day of announcement. Then, it starts declining and reaches to the 3.7 percent. The CAAR of this sub-group is the highest among figures observed in other groups. The trend of the CAAR from this sub-sample, too, does not support the semi-strong form of EMH in Nepalese stock market.

However, it has been observed that low dividend payment has stronger effect than the high dividend payment on the shareholders wealth. The evidence of positive and significant small dividend payment announcement effect seems to be inconsistent with the findings of the Grinablatt *et al*. (1984) where the study noticed larger stock dividend has stronger effect than the small dividend ratio.

2.5 Discussion

Most firms pay dividends, even though doing so is costly in various ways and market reaction to dividend announcements implies that dividends are good, and more is better. It is not surprising, then, that many theories assume or imply that dividends provide information to the market.

This study has been undertaken a systematic attempt to examine the efficiency of Nepalese stock market choosing an event study methodology and cash dividend announcement as an event. The fundamental objective was to access the semi-strong form efficiency on the Nepalese stock market. For this purpose, the market model has been used to identify the parameters of the sample stocks and use 41 days event window to calculate the average abnormal daily returns and cumulative average abnormal returns during the event window. It has been hypothesized that there are not significant abnormal returns and cumulative abnormal returns during the study period window. The observed results failed to demonstrate the semi-strong form efficient market hypothesis that investors earn significant cumulative abnormal returns prior and even after the announcement. The study further extend analysis that whether Nepalese stock market improve its efficiency after the implementation of capital gains tax and found that market did not react strongly even after 2001. Moreover, the findings of the study also reveal that small dividend payment ratio stocks have stronger effect in the market than large payment ratio stocks.

The results demonstrate that, for this sample of enterprises, announcement of dividends increases shareholders wealth. The same is true for the sub-samples. The objective of the study was not to identify what information they want to convey with dividend announcements. So, the study did not try to find the information content of cash dividend announcement. Similarly, there may have been other concurrent events which may have affected the stock prices during the event study period. Though the robust effort to separate some of the concurrent event such as bonus share (stock dividend) announcement and rights announcement has been made, the study was not focused to identify other events such as earnings announcement, mergers and acquisition etc. However, Aharony and Swary (1980) found that capital market reaction to the dividend announcements strongly support the hypothesis that changes in quarterly cash dividends provide useful information beyond that provided by corresponding quarterly earnings numbers. Thus, it can be claimed that the results of this study are robust to convey the information in the capital market.

One can be fully convinced with the idea that dividend policy has several attractive aspects as an information transmission mechanism. Unlike detailed focus of other announcements, dividends can be used as a simple, comprehensive signal of management's interpretation of the firm's recent performance and its future prospects. Unlike most announcements, dividend announcements must be backed with hard cold cash. Thus, firms must either generate this cash or convince the capital market to supply it. In addition to the credibility of cash signals, dividends are also highly visible compared with other announcements.

In conclusion, it can be said that announcement of cash dividend does matter, probably an information source and the market reaction to this information is not strong enough to justify that Nepalese stock market is semi-strong form efficient market.

In the next chapter, an attempt has been made to examine whether stock market in Nepal contains the historical information in its price. To that end, this study tests random walk hypothesis (RWH) using various time series models, particularly autocorrelation and runs tests. These tests highlight the status of weak level of efficiency in Nepalese stock market.

Chapter III

RANDOM WALK EFFICIENT MARKET HYPOTHESIS IN NEPAL

The stochastic properties of stock market returns are crucial to design investment portfolio. The presence of serial statistical dependence between current and past returns (or security prices) indicates that investors can derive profitable investment strategy based on historical information. On the other hand, the absence of such dependence accepts the weak form efficient market hypothesis (WEMH) since price changes obey to a random walk process. This chapter is, therefore, devoted to test weak form efficiency in order to identify the share price behavior in Nepal.

Random walks in stock returns are important for the formulation of rational expectations models and the testing of weak-form market efficiency. Firstly, in an efficient market, prices of stocks fully incorporate all relevant information. Hence, stock returns will display unpredictable (or random walk) behavior. Secondly, the return generating process is dominated by a temporary component in stock prices those are not characterized by a random walk, and therefore, future returns can be predicted by the historical sequence of returns. Finally, the ability of stock markets to play the role that is usually ascribed to them - attracting foreign investment, boosting domestic saving and improving the pricing and availability of capital - depends upon the presence of random walks. A market following a random walk is consistent with equity being appropriately priced at an equilibrium level, whereas the absence of a random walk infers distortions in the pricing of capital and risk. This has important implications for the allocation of capital within an economy and hence overall economic development.

3.1 Introduction

Over the years, attempts are made in developing and testing models of stock price behavior. Bachelier (1900) first advances the concept of efficient market and uses the random walk model for stock prices. It is only in the decade of 1960s that the numbers of investigations have led to the development of the random walk efficient market theory to describe share price behavior. Early studies on stock market efficiency evidenced the stochastic behavior of share prices. Later, especially after 1980s, most of the studies revealed the predictable component in stock return series (for example, Fama and French, (1988), Jegadees and Titman (1993), Lo and MacKinlay (1988)). Therefore, it is important to identify the behavior of stock prices to design an appropriate framework for analyzing investment strategy.

Traditionally, there are two major tools for performing security analysis: the fundamental analysis and technical analysis. Fundamentalists attempt to project corporate earning power, determine future earnings, and capitalize these earnings at some rate of return consistent with the degree of risk involved, thus arriving at an intrinsic value estimate. The value thus estimated is compared to existing market price in order to determine the desirability of the given investment (Levy, 1967).

Technical analysts (or chartists, as they are popularly called), on the other hand, discern patterns in price or volume movements. They study the past behavior and patterns of a given share or groups of shares to predict its (their) future price behavior. They believe that ultimately the diverse opinions of analysts and investors (who are supposed to evaluate these factors) will be reflected in the price and volume activity of the shares. They, however, assert that price and volume analysis incorporates one factor that is not explicitly incorporated in the fundamentalist approach, namely, psychology of the market. They further opined that the market is only 10 percent logical and 90 percent psychological (Malkeil, 1975). In an efficient market, investors are homogeneous in their access to information and technical analysis has no role to play (Brown and Jennings, 1989). Conversely, an inefficient market implies that investors are heterogeneously informed, and so technical analysis is of certain value (Blume *et al.,* 1994).

Chartist theories and the theories of fundamental analysis is really the province of market professional. They subscribe to a radically different approach to market analysis - the theory of random walk in stock market prices. Random walk theory of stock price behavior has been advanced to explain fluctuations in share prices and turnovers. In essence, the theory of random walks implies that the past history of stock price changes cannot be used to predict the future in any meaningful manner. Thus, an exciting and extremely important controversy has arisen in the literature between those who adhere traditional security analysis and those who believe in the notion of the efficiency of the security markets (Gupta, 1985). Despite debates on the issue, the theory has proven its popularity among the scholars in testing the return predictability of stock prices.

By definition, in an efficient market the path of prices and the return per period are unpredictable. More formally, the EMH implies that the expected value of tomorrow's price 'P_{t+1}' given all relevant information up to and including today denoted as 'Q_t' should equal today's price 'P_t', possibly up to a deterministic growth component 'μ' (drift). In other words, $E_t (P_{t+1}/Q_t) = P_t + \mu$, where, '$E_t$' denotes mathematical expectation operator given the information at time 't' (Cuthbertson, 1996). In testing the EMH commonly used model is $P_t = \mu + P_{t-1} + e_t$ where $e_t \cong$ i.i.d $(0, \sigma^2)$ or returns follow a random walk with drift, $\Delta P_t = \mu + P_t$. For a long time, these models were maintained as an appropriate statistical model of stock market behavior.

The independence of increments $\{e_t\}$ implies that the random walk is also a fair game, but in a much stronger sense than the martingale. In a random walk, independence implies not only that increments are uncorrelated, but also that any non-linear functions of the increments are also uncorrelated. Nevertheless, the financial market literature recognizes several forms of random walk hypothesis. First, empirically observed fact of time variation in the volatility of many financial asset return series has allowed unconditional heteroscedasticity in the residuals by relaxing the assumption of identically distributed increments. An even more general version of random walk hypothesis - the one most often tested in the recent empirical literature - may be obtained by relaxing the independence assumption of the model to include processes with dependent but uncorrelated increments. Tests of random walk may thus be categorized as follows: test of i.i.d. increments in errors (runs test), tests of independent increments without assuming identical distributions over time (filter rules and technical analysis) and tests of uncorrelated increments or testing the null hypothesis that autocorrelation coefficient of the first differences of the level of random walk at various lags are all zero.

Although a precise formulation of an empirically refutable efficient market hypothesis must obviously be model - specific, historically, the majority of such tests have focused on the predictable behavior of common stock returns. There are few studies that rejected the random walk model statistically. Lo and MacKinlay (1988), for example, uncovered evidence which suggests that stock returns contain predictable components. Similarly, Keim and Stambaugh (1986) also revealed the statistically significant predictability in stock prices by using forecasts based on certain predetermined variables. In addition, Fama and French (1988) showed that long-holding period returns are significant and serially correlated with negative coefficients.

Fama and French (1988) reported that price movements for market portfolios of common stocks tend to be at least partially offset over long horizons. The study also reported the negative serial correlation in market returns over observational intervals of three to five years. Nevertheless, evidence with respect to the presence of long-term dependence in stock returns is still inconclusive (Porterba and Summers (1988), and Jegadeesh (1990)). At any rate, if the mean reversion hypothesis is rejected, the asset pricing models based on Brownian motion, random walk and martingale assumptions becomes invalidate.

It was further revealed that variance in stock prices is typically not constant over time. During turbulent times, the market quickly reacts to the inflow of new information, beliefs are relatively heterogeneous, and volatility is high. During quiet times, beliefs are more homogeneous and much of the volatility comes from liquidity trading. This has led to the application of generalized autoregressive conditional heterscedasticity (GARCH) models in the stock returns. Bollerslev *et al.* (1992) conducted more than 300 studies related to stock price volatility. Other types of deviations are the calendar anomalies, like January effect, which had already been discovered in the stock market by Wachtel (1942), among others. Clearly, this led new techniques to test and model stock market data.

The studies on stock price behavior, too, had shown a considerable interest in the long run time series properties of stock price, with a particular attention being paid to investigate whether stock prices characterized as unit root (random walk) or mean reverting (trend stationary) process. If stock prices follow a mean reverting process then there exists a tendency for the price level to return to its trend path over time and investors may be able to forecast future returns by using information on its past returns. On the other hand, a random walk process says that any shock to stock price is permanent and there is no tendency for the price level to return to a trend path over time. This suggests that future returns are unpredictable based on historical observations. The random walk property also implies that the volatility of a stock price can increase without bound in the long-run. These time series properties are not only of interest by themselves but also have important implications for asset pricing.

In general, the random walk test measures whether past series of share prices or returns can be used to predict future share prices or returns. The major empirical investigation of the above test measures the statistical dependence between price changes. If no dependence is found, this provides evidence in support of the randomness. This implies that no profitable investment-trading strategy can be derived based on past prices. However, whether any trading rule is profitable depends largely on the operating costs (such as brokerage cost, interest cost, trading settlement procedure) and on whether transactions can be made at the exact prices quoted in the market.

The rest of the chapter is organized as follows. In the next section, an extensive review of random walk test along with studies on return predictability is presented. The model and data for random walk tests are presented in section 3.3. Section 3.4 contains the analysis of data and results. Finally, a discussion over the results is presented in section 3.5.

3.2 Random walk efficient market hypothesis: A survey of evidence

The efficient market hypothesis (EMH) had its genesis in the random walk theory of the movement of security prices that appeared in literature in the late 1950s. Actually, the earliest known study on the distribution of security prices was conducted by Louis Bachelier (1900). Following Bachelier, a number of studies have been emerged to measure the degree of efficiency of the stock markets of developed and emerging markets.

Historically, random walk model dates back to the year 1900. In a pioneer work, Bachelier (1900) developed a theory that speculative prices follow random walks on the assumption of zero expectation of gain (Alexander, 1961). The study presented convincing evidence that commodity speculation in France was a 'fair game' and that the current price of a commodity was an unbiased estimate of its future price. Thus, it was revealed that recent historical data were useless for predicting future price changes. Unfortunately, the findings of the study remained undetected in the Anglo-Saxon world for sixty years until they were rediscovered in 1960. After Bachelier (1900), further studies on the behavior of security prices progressed rather slowly.

Slutskey (1927) is given the credit of an independent rebirth of the random walk. The study showed that randomly generated price changes look like stock price changes and that they appear to exhibit cycles and other patterns. Like Bachelier (1900), the study, too, did not receive much attention during this period.

Additional evidence that security prices follow a random walk was found by Working (1934), Cowles and Jones (1937) and Kendall (1953). Working (1934) extensively analyzed commodity prices and noted that speculative price patterns might be shown random. Surprisingly, it did not receive much attention from other contemporary researchers. Cowles (1933), on the other hand, revealed little evidence that stock market analysts could predict prices. Contrary to it, Cowles and Jones (1937) reported that stock prices move with predictable trends. In fact, the findings remained as damning evidence against the random walk hypothesis for more than two decades until they were withdrawn in 1960 after Working (1960) had pointed out an error in their analysis. These studies were more concerned with analyzing the statistical properties of economic time series data than with making conclusions about investment strategies along with evidence of market efficiency in the weak form (Dyckman *et al.*, 1975).

Kendall (1953) made significant advances in the random walk model on the UK share prices. The study analyzed the behavior of weekly changes in the 19 indices of British industrial share prices and two commodity spot price series: one for cotton (New York) and the other for wheat (Chicago). After extensive analysis of serial correlations it was reported that stock price changes behaved as if they had been generated by a suitably designed roulette wheel. This meant that each outcome was statistically independent of past history. Using periods of 1, 2, 4, 8 and 16 weeks - when stock prices are observed at fairly close intervals - the random changes from one term to next revealed to be so large as to swamp any systematic effect which may be present. This led to conclude that there is no hope of being able to predict movements on the exchange for a week ahead without extraneous information (Kendall, 1953).

While these early studies made significant contributions to development of the random walk theory, they were more concerned with analyzing the statistical properties of stock price series rather than suggesting an economic rationale for the model which was provided much later by other studies. In sum, despite the existence of some scattered evidence in the literature that stock prices, indeed, follow a random walk, prior to 1959, no one seriously questioned the doctrine of technical stock market particularly in the United States. Thus, the interest in the random walk hypothesis of stock price movements did not strictly begin until 1959.

Roberts (1959) further contributed the empirical analysis into the random walk hypothesis by comparing the levels of the Dow Jones Industrial Average (DJIA) with the levels of a variable generated by a random walk mechanism. It was observed that a series of a cumulative random number would closely resemble actual stock price series. The study was the first attempt to show that classical patterns of technical analysis can be generated artificially by a suitable roulette wheel or random number table. The chance model and runs analysis were suggested as a methodological tools for testing the significance of independence of price changes and concluded that the random walk mechanism produced patterns very similar to the patterns of stock price movements.

In a like fashion, Osborne (1959) examined stock prices to see whether they conformed to certain laws governing the motion of physical objects, for example, 'Brownian motion'. The study reported a very high degree of conformity between the movements of stock prices and the law governing stock prices. It was further revealed that security prices behaved in a manner consistent with a Brownian motion in which the price change in one period was independent of the price change in any preceding period.

A number of additional studies appeared which attempted to test whether security prices followed a random walk after the appearance of the Roberts (1959) and Osborne (1959). Moore (1964) looked at the serial correlation of weekly changes in the prices of 30 randomly selected stocks for 1951-58. In particular, the correlation of one week's price change with the next week's price change was measured. The study reported an average serial correlation of - 0.06 which might indicate a very slight tendency for security price changes to reverse themselves, that is, for a price rise to follow a price fall and vice versa. However, the evidence was so weak that it cannot be interpreted as being different from an average correlation of zero, which implies no association at all. Further, the existence of such a price reversal of 0.06 would not allow sufficient returns to compensate for the transactions costs involved. A market index, based on the price changes of 25 of these stocks, exhibited a faint pattern over time, as the first order serial correlation coefficient was +0.153. This led to conclude that indices of stock price relatives behave detectably different from individual price relatives at least on New York Stock Exchange (NYSE) for the time period covered by this sample (in Cootner, 1964).

Cootner (1962) examined weekly price data on 45 NYSE listed stocks and tested for their randomness by means of a mean-square successive difference (Von Neuman ratio). The study reported that stock prices appeared to move randomly when studied at one-week interval. However, some evidence of trends in the same data at 14 weeks interval was also observed. Essentially, the emphasis was on the importance of differencing interval while testing for randomness in stock price behavior. Further, there was not one random walk model, but one for every definition of past and future. Thus, the study showed that stock prices followed a random walk when examined at weekly interval but produced trends when studied at longer differencing intervals such as 14 weeks.

King (1966) showed the monthly changes of 63 selected stocks between 1927 and 1960. The study found them to obey the random walk model, the average correlation coefficient being +0.02. The study also estimated serial correlation coefficients for each of four sub-periods and obtained average values of 0.102, -0.110, -0.047, and –0.053 respectively.

Fama (1965) is considered to be one of the most definitive studies of the random walk model ever conducted. The study examined the daily proportionate price changes of 30 industrial stocks in the DJIA for approximately five years, ending in 1962. The serial correlation coefficients for the daily changes reported by the study were all very small, the average being 0.03. It was further tested whether lagged price changes show some dependence. Again, the serial correlation coefficients did not differ substantially from zero. The study estimated serial correlation coefficients for differencing intervals of four, nine and sixteen days to examine the possibility of whether price changes across longer differencing interval show stronger evidence of dependence. The average coefficients were -0.04, -0.04, and +0.01, respectively. This led to conclude the evidence produced by the serial correlation model seems to indicate that dependence in successive price changes is either extremely slight or completely non-existent (Fama, 1965).

Fama (1965) used runs tests to examine whether price changes were likely to be followed by more price changes of the same sign. In general, the study found that the difference between the actual and expected number of runs was statistically insignificant, although there appeared to be a slight tendency for run in daily changes to persist. This was in conformity with the serial correlation result since the coefficients for daily changes were predominately positive though insignificant. In any case, the departure from randomness was negligible. On the basis of these tests, the study contends that there is little evidence, either from the serial correlations or from the various runs tests, of any large degree of dependence in the daily, four day, nine day and sixteen day price changes. It was further pointed out that as far as these tests are concerned, there is no evidence of important dependence from either an investment or statistical point of view. Thus the conclusion of the study was to present the strong and voluminous evidence in favor of the random walk hypothesis. While interpreting the results it should, however, be remembered that Fama's sample included only 'blue-chips'. It is quite likely that these 'blue-chips' behave differently from a more representative set of stocks. In any case, the study produced substantial evidence in support of the random walk model.

In addition to serial correlation and runs tests some studies have also used spectral analysis to test the random walk hypothesis. For example, Granger and Morgenstern (1963) applied spectral methods to the numbers of price series from NYSE. In general, the study showed that short run movements in stock prices followed a simple random walk model. However, the study reported that the long run movements are not adequately explained by this model. In yet another study, Granger and Morgenstern (1970) reported the spectra of log price differences are flat for all the series over a frequency range of 0.5 cycles per year up to 0.5 cycles per day covering more than fifty stock market price series over several time periods with differing sampling intervals. This suggests that short-term price movements are random walks. However, the study revealed some deviations from the random walk model in both the high and low frequency regions of the spectrum. This would imply that the model does not adequately describe the movements within the very short period, for example, transaction-to-transaction data, and movements within a very *long period. It should, however, be noted that the random walk model has been put forward as an explanation of the short term price changes and it is not intended to explain long term trends in price series.*

The studies reviewed aimed at directly testing whether successive price or return changes are largely independent. Overwhelmingly, they appear to support the view that stock price changes are random and the past prices cannot be used to earn an abnormal rate of return. As a result, it would be extremely difficult to develop successful mechanical trading rules based on the past history of price changes. However, some studies advocated technical analysis contending that these tests were too narrow and unsophisticated to pickup the complicated patterns of stock prices. They argued that these tests do not prove that more complex strategies cannot be formulated to use past price data to earn an abnormal rate of return.

In order to meet these challenges of the technical analysts, Alexander (1961) devised filter techniques based solely on price changes to see whether an abnormal return could be earned by using such rules. Essentially, filter tests are based solely on price changes to see whether an abnormal return could be earned by using such rules. Filter tests are based on the premise that once a movement in price has surpassed a given percentage movement, the securities price will continue to move in the same direction, that is pattern exist in the market. An x percent filter rule has been defined as follows:

If the daily closing price of a particular security moves up at least 'x' percent, buy and hold the security until its price moves down at least 'x' percent from a subsequent high, at which time simultaneously sell and go short. The short position is maintained until the daily closing price rises at least 'x' percent above a subsequent low at which time one covers and buys. Moves less than 'x' percent in either direction are ignored.

Alexander (1961) reported empirical results based on the filter techniques for filters ranging in size from 5 to 50 percent. This test covered different time periods from 1897 to 1959 and involved closing prices for two indices, the DJIA from 1897 to 1929 and

Standard and Poor's Industrials from 1929 to 1959. In general, the study indicated that filter rules (particularly for small filters) produced high rates of return in comparison to a buy-and-hold policy. This led to conclude that speculative market price changes appear to follow a random walk over time, but a move, once initiated, tends to persist.

Mandelbrot (1963), however, noted several shortcomings in the Alexander (1961). In particular, Alexander (1961) did not take into account the transaction costs. Moreover, the assumption that stock could be bought or sold at the precise price at which the signal to buy or sell is given was also unrealistic. After extensive testing Fama and Blume (1966) showed that filter schemes could not, in general, provide larger returns in comparison to a buy-and-hold policy when dividend and transaction costs are taken into account. The study concluded with the presence of both positive and negative dependence in price changes. The order of magnitude of dependence is so small, however, that the results add further to the evidence that for practical purposes the random walk model is an adequate description of price behavior (Fama and Blume, 1966). Similarly, James (1968) and Van Horne and Parker (1967) showed various trading rules based upon making averages of past prices do not yield profits greater than those of a buy-and-hold policy (Jensen and Bennington, 1970).

Levy (1967) tested the random walk hypothesis using several different strategies essentially based on relative strength. The samples consisted of weekly closing prices of 200 stocks from NYSE covering a 200-week period from 1960 to 1965. In essence it was suggested that stocks which had higher than average price changes in the preceding six months tended to show higher than average price changes in the next six months. Random price behavior, on the other hand, should have resulted in only average results for the second six-month period. Thus, it holds that stocks with relatively above (or below) average performance in the past six months tended to have above (or below) average performance in the next six month. The study claimed to have found a rule which performed better than a buy- and- hold policy. This led to conclude that stock prices *follow discernible trends and patterns which have predictive significance and the theory of random walk has been refuted (Levy, 1967).*

However, Jensen (1967) pointed out that, due to several errors, the results reported by Levy (1967) overstated the excess returns earned by the buy-and-hold comparison. Essentially, the study had tested the same technical rules on the same data as were used to select the model in Levy's study.

In sum, the evidence produced by these early studies indicated that filter techniques do not provide higher returns than those obtainable from a simple buy and hold policy. Thus, in general, tests based on filter rules also tend to support the applicability of the random walk model to describe stock price behavior in the United States and that these markets are efficient in a weak sense.

Following Fama (1970), a number of studies documented that the stock markets in the developed countries are either weak or semi-strong form efficient. Although several seemingly anomalous departure from market efficiency have been well documented, many studies would agree with Jensen's (1978) belief that there is no other proposition in economics which has more solid empirical evidence supporting it than the efficient market hypothesis. However, several studies have uncovered empirical evidence which suggests that stock returns contain predictable components (Lo and MacKinlay, 1988).

Studies on RWH after 1980s reported evidence of predictability of returns on market indices and size-sorted portfolios. For example, DeBondt and Thaler (1985) reported reversals in long-term returns being stocks with low long-term past returns tend to have higher future returns. The study mount an aggressive empirical attack on market efficiency, directed at unmasking irrational bubbles. It used the monthly return data between 1926 and 1982 for stocks listed on NYSE (as compiled by the Center for Research in Security Prices (CRSP) at the university of Chicago)) to form portfolios of the 50 most extreme winners and 50 most extreme losers (as measured by cumulative excess returns over successive five-year formation periods). The study further reveals that the NYSE stocks identifies as the most extreme losers over a 3-to 5-year period tend to have strong returns relative to the market during the following years, especially in January of the following years. Conversely, the stocks identified as extreme winners tend to have weak returns relative to the market in subsequent years. It was reported that over the following five-year test periods the portfolios of losers outperformed the portfolios of winners by an average of 31.9 percent.

In contrast, Jegadeesh and Titmtan (1993) revealed that short-term returns tend to continue, stocks with higher returns in the previous twelve months tend to have higher future returns. Similarly, Keim and Stambaugh (1986) find statistically significant predictability in stock prices by using forecasts based on certain predetermined variables. Poterba and Summers (1988), together with Fama and French (1988a, b), discussed the linkage between short-horizon positive serial correlations in stock returns, accompanied by negative correlation over longer intervals. In addition, Lo and MacKinlay (1988), supporting the predictable behavior of the stock market prices, reported significant positive serial correlations for weekly and monthly holding period returns. Others show that a firm's average stock return is related to its size (ME, stock price times number of shares), book-to-market equity (BE/ME, the ratio of the book value of common equity to its market value), cash flow/price (C/P), and past sales growth (Banz (1981), Basu (1983), Rosenberg et al. (1985) and Lakonishok et al. (1994)).

However, many issues regarding the ‘winner-loser’ effect were left unresolved. For example, pronounced seasonality in the ‘price correction’ (almost all of it occurs in the successive months of January, especially for the losers), asymmetric correction (after the date of portfolio formation, losers win approximately three times the amount that winners lose) and characteristics of the firms in the extreme portfolios were not fully described. In addition, the interpretation of the results as evidence of investor overreaction had been questioned (DeBondt and Thaler, 1987).

The interpretation of the results of DeBondt and Thaler (1985) are still being debated. Chan (1988) and Ball and Kothari (1989) argued that the winner-loser results *are due to failure to risk adjusted returns. Likewise, Zarowin (1989) indicated no evidence for the DeBondt-Thaler hypothesis that the winner-loser effect is due to overreaction to extreme changes in earnings. The study revealed that the winner loser effect is related to the size effect of Banz (1981); that is, small stocks, often losers, have higher expected returns than large stocks (Fama, 1991).*

In contrast, DeBondt and Thaler (1987) claimed that their data do not support the explanations of the winner-loser effect based on the size or risk characteristics of the winning and losing firms. The study, however, admitted that time-varying discount rates might play a role in explaining the observed price reversals. Similarly Jegadeesh (1990) and Lehmann (1990) provided evidence of short-term return reversals. These studies show that contrarian strategies that select stocks based on their returns in the previous week or month generate significant abnormal returns. Jegadeesh (1990) examined the predictability of monthly returns on individual securities which provides new evidence of stock return predictability. The results showed that the monthly returns on individual stocks exhibit significantly negative first-order serial correlation and significantly positive higher-order serial correlation. The pattern of serial correlation exhibited seasonality, with the pattern in January significantly different from that in the other months.

Lehmann (1990), on the other hand, used the weekly returns data and concluded that the results strongly suggest rejection of the efficient market hypothesis. Portfolios of securities that had positive returns in one-week typically had negative returns in the next week (-0.35 to –0.55 percent per week on average), while those with negative returns in one week typically had positive returns in the next week (0.86 to 1.24 percent per week on average). The costless portfolio - that is, the difference between the winners and losers portfolios - has positive profits in roughly 90 percent of the weeks and, if the strategy is viewed as having a twenty-six week horizon, the profits were positive in each of the 49 six-month periods covered by the data (Lehamann, 1990).

However, these strategies are transaction incentive and are based on short-term price movements; their apparent success may reflect the presence of short-term price *pressure or a lack of liquidity in the market rather than the overreaction. Jegadeesh and Titman (1991) provided evidence on the relation between short-term return reversals and bid-ask spreads that supports this interpretation. In addition, Lo and MacKinlay (1990) argued that a large part of the abnormal returns documented by the Jegadeesh (1990) and Lehmann (1990) is attributable to a delayed stock price reaction to common factors rather than to overreaction.*

Many portfolio managers and stock analysts subscribe to the view that momentum strategies yield significant profits. Jegadeesh and Titman (1993) examined a variety of momentum strategies and document that strategies that buy stocks with high returns over the previous 3 to 12 months and sell stocks with poor returns over the same time period earn profits of about one percent per month for the following year.

In a related literature, a number of studies have showed evidence of mean reversion in returns on stock portfolios at horizons of three to five years or longer. Fama and French (1988) showed that the autocorrelations of returns on diversified portfolios of NYSE stocks for the 1926-1985 periods have the pattern predicted by the Shiller-Summers model. The autocorrelations are close to zero at short horizons, but they become strongly negative, around –0.25 to –0.4, for 3- to- 5-year returns. Interestingly, when deleted the 1926-1940 periods from the tests, the evidence of strong negative autocorrelation in 3-to 5-year returns disappeared. The study concluded that the autocorrelations for the periods after 1940 are closer to zero, and they do not show the U-shaped pattern of the overall period. Because sample sizes for long horizon returns are small, however, sample autocorrelations cannot identify changes in the long time-series properties of returns. Stationary price components may be less important after 1940, or perhaps prices no longer have such temporary components. Resolution of this issue will require more powerful statistical techniques.

Similarly, Porterba and Summers (1988) indicated that; for N from 2 to 8 years, the variance of N-year returns on diversified portfolios is much less than in proportion to N. This is consistent with the hypothesis that there is negative autocorrelation in returns *induced by temporary price swings. Even with 115 years (1871-1985) of data, however, the variance tests for long-horizon returns provided weak statistical evidence against the hypothesis that returns have no autocorrelation and prices are random walks.*

The findings of large predictable component in long horizon returns does not necessarily imply market efficiency, as the variation in expected returns could be due to a time varying risk premium. Indeed, consistent with the idea of slowly moving equilibrium risk premium, Fama and French (1988b) showed that the variation in dividend yields explains a large proportion of multi-year return predictability. Poterba and Summers (1988), though, argued that the magnitude and variability of the implied risk premium is too large to be explained by appeal to any rational asset pricing theory. The study claimed that asset prices are characterized by speculative fads in which market prices experience long systematic swings away from rational fundamental prices. These highly serially correlated fads are difficult to distinguish from a martingale model on the basis of the earlier short horizon tests for market efficiency, but their existence is more evident in long-horizon autocorrelations of returns (Bollerslev and Hodrick, 1992).

Kim *et al*. (1991) reevaluated the empirical evidence relating to mean reversion. By using the autoregressions discussed by Fama and French (1988) and the variance ratio methodology of Poterba and Summers (1988), the study revealed that the mean-reverting behavior of share prices was a pre-war phenomenon, with post-war data actually displaying mean-averting behavior. This result was obtained by using randomization methods to calculate significance levels instead of the Monte Carlo method under a normal assumption. But Cutler *et al*. (1991) provided evidence supporting the conclusion of Poterba and Summers (1988) and Fama and French (1988) using an array of data sets on asset types. The study found that returns tend to be negatively serially correlated over long horizons but positively correlated over short horizons. Note that although the variance ratio and regression tests assume linearity, the findings suggest the possibility of non-linear patterns in returns. An interesting approach that addresses the non-linearity was undertaken by McQueen and Thorley (1991). The study used a Markov chain model to test the random walk hypothesis of share price returns. Returns are assumed to be drawn from either a high return state or a low return state, with the probability of staying in or switching to an opposite state governed by the transitional probabilities. This approach allowed the parameters (transition probabilities) to vary depending on a given sequence of prior states. The random walk hypothesis imposes the constraint of equal transitional probabilities. After conducting likelihood ratio tests, the restriction was rejected, with the findings that shares do not follow a random walk in the postwar period.

Lo and MacKinlay (1988) provided further evidence that stock prices do not follow random walks by using a simple specification test based on variance estimators. The results of the study indicated that the random walk model is generally not consistent with the stochastic behavior of weekly returns, especially for the smaller capitalization stocks. Using 1216 weekly observations from September 6, 1962, to December 26, 1985, the study computed the weekly first-order autocorrelation coefficient of the equal weighted Center for Research in Security prices (CRSP) returns index to be 30 percent. The autocorrelation is stronger for portfolios for small stocks. This suggested that the results are due in part to the nonsynchronus trading effect (Fisher, 1966). In contrast to the negative serial correlation that Fama and French (1988) showed for longer horizon returns, the study revealed significant positive correlation for weekly and monthly holding period returns. It is further claimed that statistical significance of results of the study is robust to heteroscedasticity. The study, however, concluded that the rejection of the random walk model does not necessarily imply the inefficiency of stock price formation (Lo and MacKinlay, 1988).

To mitigate the nonsynchronous trading problem, Conrad and Kaul (1988) examined the autocorrelation of Wednesday-to-Wednesday returns for size-grouped portfolios of stocks that trade on both Wednesdays. Like Lo and Mackinlay (1988), the study revealed that weekly returns are positively autocorrelated, and more so for portfolios of small stocks. The results of Lo and MacKinlay (1988) and Conrad and Kaul (1988) showed that, because of the variance reduction obtained from diversification, portfolios produce stronger indications of time variation in weekly-expected returns than individual stocks. The results also suggested that returns are more predictable for small stock portfolios. The evidence is, however, clouded by the fact that the predictability of portfolio returns is in part due to nonsynchronous trading effects that, especially for small *stocks, are not completely mitigated by using stocks that trade on successive Wednesdays (Fama, 1991).*

French and Roll (1986) was an eye-opener among studies on return predictability of short-horizon returns. The study established an intriguing fact that the stock prices are more variable when the market is open. On an hourly basis, the variance of price changes is 72 times higher during trading hours than during weekend nontrading hours. Likewise, the hourly variance during trading hours is 13 times the overnight nontrading hourly variance during the trading week.

One of the explanations that French and Roll (1986) test is a market inefficiency hypothesis, which showed that the higher variance of price changes during trading hours is partly transitory. Under this hypothesis, pricing errors due to noise trading are eventually reversed, and this induces negative autocorrelation in daily returns. French and Roll (1986) further revealed that the first-order autocorrelations of daily returns on the individual stocks of larger (the top three quintiles of) NYSE firms are positive. Otherwise, autocorrelations of daily returns on individual stocks are indeed negative to 13 lags. Although reliably negative on a statistical basis, however, the autocorrelations are on average close to zero.

The long horizon returns are dramatic, but the studies offer far from conclusive evidence regarding efficient markets. First, the results need not be interpreted as evidence for stock market fads. An alternative interpretation of these results holds that they indicate only that market risk premiums vary over time. The response of market prices to variation in the risk premium can lead only to incorrectly to infer the presence of mean reversion and excess volatility in prices. Second, these studies suffer from statistical problems. Because they rely on returns measured over long time periods, these test of necessity are based on few observations of long-horizon returns. Moreover, it appears that much of the statistical support for mean reversion in stock market prices derives from returns during the Great Depression. Other periods did not provide strong support for the fads hypothesis.

In general, studies on RWH have shown that stock prices seem to follow a random walk with no discernible predictable patterns that investors can exploit. Such findings are now taken to be evidence of market efficiency, that evidence that market prices reflect all currently available information. Only new information will move stock prices, and this information is equally likely to be good news or bad news. However, the studies conducted after 1980's generally support the hypothesis that stock prices do have some predictable component.

Attempts have also been made to study the behavior stock prices in several other countries. However, empirical results of non - US studies are less decisive either in refuting the applicability of the random walk model or in accepting it as a valid description of share price behavior in those countries.

In a study of relatively smaller stock market, Niarchos (1972), using price series of 15 individual stocks and 2 indices from the Athens Stock Exchange (Greece) during January 1957 to December 1968, showed an average value of 0.036 for the first order serial correlation coefficient for the individual stock price series. The first order serial correlations of individual stocks were all close to zero, thus suggesting that those series were random. The results obtained, thus, indicated that the Greek stock market was efficient in the weak sense.

As far as British stock market is concerned, the empirical results are somewhat indecisive. For example, Dryden (1970), using three London daily indices for approximately 4 years, revealed the first order serial correlation coefficients to be statistically significant for all the series. However, most of the higher order coefficients reported were insignificant. The study, then, subjected his data to filter tests. It was reported that they produced substantially higher rate of return in comparison to a buy and hold policy for small and medium size filters when transaction costs were ignored. The study argued that the high rates of return obtainable from the application of filters together with the absence of pattern of relationships which would be expected in the presence of series following random walk suggest that considerably more dependence *might exist in U.K. shares than in those of U.S. (1970). Thus, on the basis of both filter and serial correlation tests, the study found sufficient divergence from the random walk hypothesis to justify a more extensive analysis of the behavior of individual shares quoted on the London Stock Exchange.*

Dryden (1970), in a later study, analyzed daily closing prices of 15 individual U.K. shares. Interestingly, all the tests, namely serial correlations, runs analysis and filter tests carried out seem to support the random walk model for the individual stock price series. For example, bulks of the serial correlation coefficients for daily changes reported by the study were numerically small and statistically insignificant. Similarly, no evidence of dependence for four and nine-day price changes were reported. In addition, the study did not observe much discrepancy between the actual and expected number of runs. Thus, it was concluded that the available empirical results of serial correlation analysis and runs tests must be regarded as evidence in support of the random walk theory (Dryden, 1970).

However, Kemp and Reid (1971), using non-parametric tests on daily price series of 51 stocks over a remarkably short period (50 days), reported that share price movements were conspicuously non-random over the period considered. It was contended that the findings of the study should be a caution to those who have been startled by the apparent findings of randomness in share price movements in their studies. The results of the study should be used with caution because of the use of non-parametric tests and the period of the study was extremely short.

Jennergen and Korsvold (in Elton and Gruber, 1975), analyzed daily price series of 45 stocks - 15 from the Oslo Stock Exchange (Norway) and 30 from the Stockholm Exchange (Sweden) - during 1967 to 1971 by means of serial correlations and runs analysis, revealed considerable dependence in both the Norwegian and Swedish stock market prices. For instance, the study reported 18 out of 30 first order coefficients (for Swedish stocks) larger than three standard errors in absolute values and an additional 8 coefficients greater than twice their standard errors. Similarly, the first order coefficients for 8 of the Norwegian stocks (out of 15) were larger than two standard values. The mean *absolute serial correlation coefficients for lag 1 were 0.83 for Norway and 0.109 for Sweden. These results were corroborated by runs analysis also. Their mean standardized variable (for differencing interval) was - 4.9 for Norway and 4.64 for Sweden.*

On the basis of these tests, the study concluded that the random walk hypothesis is probably not a very accurate description of share price behavior on the Norwegian and Swedish stock market. However, the study suggested that it still remain open whether Norwegian and Swedish stock markets are, in fact efficient or inefficient in the weak sense. In any case, the important question was whether the deviations from randomness were so large that one could exploit them to make abnormal trading profits.

In an effort to test this possibility, Jennergren (in Elton and Gruber, 1975) conducted filter tests on the 30 stocks from the Swedish stock market during October 1967-1971. The study reported that the Swedish stock market exhibits larger deviations from randomness, so that somewhat profitable rules may exist. However, the study argued that the question whether the Swedish stock market is weekly inefficient still remains an open one.

Conrad and Juttner (1973) investigated the behavior of daily prices of 54 German Stocks during January 1968 to April 1971 by means of both parametric and non-parametric tests, revealed greater degree of dependence in German stock price behavior. The study reported significant divergence between the observed and expected number of runs. Serial coefficients for majority of stocks deviate significantly from the null hypothesis and a proportion diverges to such an extent the dependence revealed in the price changes is not only important from the statistical point of view but also from an investor's point of view. This led to suggest that the random walk theory is inappropriate to describe the behavior of recent share prices in Germany. The empirical evidence did not stand up well to the theory that the stocks as being traded in an efficient market, which is well organized and highly competitive, fully reflect publicly available information. Thus the study concluded that the German stock market cannot be said an efficient one.

Praetz (1969), using serial correlation and runs tests on three sets of price data from Australian stock exchanges, came to the conclusion that in a looser sense the random walk hypothesis is a useful first approximation as a description of the series of price changes.

Thus, as far as stock markets of countries other than US are concerned, they provide mixed results. This is probably due to the fact that the issue of autocorrelated stock returns, especially multi-period returns, requires a long time series of high quality data. Of course, it must be borne in mind that stock exchanges are far from homogenous organizations. They differ from country to country in terms of organization, ownership, size, legal constraints governing their administration, disclosure of information, investor incentives such as taxation etc. An attempt has been made, therefore, to overview the behavior of share prices in emerging and developing markets.

Gandhi *et al*. (1980) had attempted to measure the efficiency of the Kuwaiti stock market using a monthly index return data from the end of December 1975 to May 1978. The results indicated that share prices tend to move systematically over time. This would enable investors, who are able to identify share price movements to consistently 'beat the market'. The study, on the basis of volatility test, runs analysis and serial correlation tests, concluded that Kuwaiti stock market is inefficient in price determination.

Random walk test has been conducted for 50 major stock markets scattered throughout the world to understand the price behavior of international stock markets. Cooper (1982) employed time domain test (serial correlation analysis), a non-parametric test (runs analysis) and a frequency domain test of the error series (spectral analysis) to test the RWH. Each of these tests was applied to samples of monthly, weekly and daily data from the stock markets. The study lent further weight to the random walk hypothesis for USA and UK at least for the samples and time periods studied. It is interesting to note that neither the runs test nor spectral test did the London market exhibit any degree of dependence while the serial correlation coefficients were very small. For all other markets, the study revealed less clear evidences. In general, serial correlation coefficients tend to be small although they were usually greater than those for the UK and USA at least for the indices. The study further examined the extent of randomness with individual shares. In several instances, the evidence became more uncertain with the fact that where an index has appeared to follow a random walk, some of that market's constituent shares displayed some degree of non-randomness.

The evidence that RWH does not hold good in emerging market was supported by Wong and Kwong (1984). The study examined the behavior of Hong Kong stock prices using serial correlation analysis and runs test to provide the evidence on the independence of successive stock price changes. Tests were based on 28 out of 33 Hang Seng Index constituent stocks. The period of investigation covered from January 1977 to December 1980 using daily price series. The results of daily serial correlation coefficients for lag (k = 1, 2, ….5) showed that the magnitude of statistical dependence in successive stock price changes in the Hong Kong market is larger than in Fama (1965). The study concluded that the overall evidence failed to give a clear support to the weak form efficiency in Hong Kong stock market. Contrarily, Barnes (1986) examined price behavior of 30 companies and six sector indices for Kuala Lumpur Stock Exchange (KLSE). The study observed monthly returns on shares and test applied were: serial correlation coefficient, runs analysis and spectral analysis. The study concluded that KLSE exhibited a high degree of efficiency in the weak form. Both tests showed that there was very little departure from the random walk hypothesis within confidence intervals of two and three standard errors.

RWH was also compared into cross - country stock markets in emerging countries. For example, Ko and Lee (1991) analyzed comparatively the daily behavior of stock returns among Japan, the US and the Asian NIC (Taiwan, Korea, Hong Kong and Singapore). The study selected value weighted stock index of all shares for each stock market from January 1981 through December 1988, except for Hong Kong. Both the serial correlation and runs analysis were used to test the market efficiency in the weak form. Further, Markov chain models were developed and tested in order to determine the exact order of the stock return process. The results indicated that weak form market efficiency does not hold except in the US market. The results were consistent with those of the runs test. Similarly, Groenewold (1997) had studied to test for weak and semi-strong efficiency of the Australian and New Zealand share markets using share price indices for the period 1975-92. Weak efficiency was tested by using stationarity of the log of the price process and autocorrelation structure of returns. The basic results using daily observations for both the countries' index were consistent with the non-staionarity implication of the weak EMH. Semi-strong efficiency was tested using the notions of cointegration and Granger causality. The study revealed that two countries' indexes were not cointegrated, a finding consistent with market efficiency.

The study on RWH was extended to developing and small stock markets. For example, Dickinson and Muragu (1994) tested the efficiency of Nairobi Stock Exchange. The study used weekly returns of 30 sample companies. The results from the individual serial correlation coefficients indicated that the majority of them were not statistically different from zero. Similarly, the results of runs test indicated that the price series of the majority of the companies were random. The overall results, thus, provided evidence that small markets such as the Nairobi Stock Exchange might be consistent with weak-form efficiency. Likewise, Abeysekera (2001) examined the behavior of stock returns in the Colombo Stock Exchange (CSE). The data employed included daily, weekly and monthly return of stock indices for the period January 1991 through November 1996. The study used serial correlation test, runs analysis and unit root test to determine the level of independence of successive returns. The results of the study indicated that the stock traded in CSE did not behave in a manner consistent with the weak form of the efficient market hypothesis.

Instead of using traditional tools for testing RWH, studies on developing stock markets have also used dynamic models such as autoregressive and ARIMA tests, variance ratio test, and unit root test. For example, Abraham *et al.* (2002) assessed RWH and market efficiency hypothesis using variance ratio and runs test for three Gulf equity markets namely, Saudi Arabia, Bahrain and Kuwait. The data consists of weekly index values for the period October 1992 to December 1998. All indices used were value weighted. The results indicated that the RWH and weak form efficiency were rejected for the Gulf markets. However, if corrected indexes were used, the results showed some reverse pattern. Similarly, Odabasi *et al*. (2004) tested whether the rapid development of the Turkey's stock market over the last decade turned into more efficient market. The study used a sample of 2980 daily, 593 weekly and 144 monthly observations of the value weighted Istanbul Stock Exchange (ISE) 100 series for the period January 1988 through December 1999. Besides the index data, individual stock return data were used to construct the size-sorted portfolios. The study employed autocorrelation test, runs test, variance ratio test and unit root test to identify the behavior of share prices over the period. The results of the study indicated that ISE is moving towards more informationally efficient market. Likewise, Seddighi and Nian (2004) had examined the efficiency of Shanghai Stock Exchange using daily data. The testing procedure in the study involved the three processes. The first one to use the Durbin-Watson test, Durbin 'h' test and the Lagrange Multiplier test for autocorrelation to examine the assumption of the model that the successive occurrences are independent. Second, the study used the Dickey-Fuller tests for unit root to test the assumption that the occurrences are identically distributed. Finally, autoregressive conditional heteroscedasticity (ARCH) test was used to examine whether the residuals contain some hidden, possibly non-linear structure. The results suggested that Chinese stock prices did not follow a random walk process. In a like fashion, Belaire-Franch and Opong (2005) conducted study utilizing tests based on ranks and signs suggested by Wright (2000) in addition to the traditional variance ratio test to examine the behavior of some UK Financial Times Stock Exchange (FTSE) indices. The indices tested were FTSE All Shares index, FTSE 100 index, FTSE 250 index and FTSE 300 index. The study used daily price data from the base period of the index series. The results suggested that the null hypothesis of random walk behavior of the index series was rejected. The study further revealed that the use of nonparametric based variance ratio tests provide stronger and more rejections of random walk behavior than the conventional variance ratio tests under conditions of homoscedasticity and heteroscedasticity in the index series examined.

In sum, early studies (pre - 1980) revealed that stock prices move randomly indicating that successive prices are independent of historical prices. Later, there are evidences of some predictable patterns in the share price movements. The results of small and emerging markets shows mixed results in terms of randomness in stock markets. Most of the studies in both developed and developing markets used traditional models such as serial correlation and runs test to identify the behavior of share prices. Some studies, however, used dynamic time series model such as unit roots, autoregressive model, autoregressive integrated making average (ARIMA) and G(ARCH) models to examine the stochastic behavior of stock markets in different countries.

Though the results of random walk tests provided mixed results in advanced stock markets, it is interesting to test the hypothesis in relatively small and developing markets like in Nepal. The present study is an attempt in this direction.

3.3 Study methodology

This section describes the following aspects of research methodology to test the random walk hypothesis in Nepalese stock market: (i) The model, (ii) Nature and sources of data, (iii) Selection of enterprises, (iv) The variables, and (v) The hypotheses.

3.3.1 The model

A number of test methodologies are available to determine the independence of successive price changes. Earlier, Bachelior-Osborne model and Mandelbrot and the Generalized Central Limit Theorem came into existence to justify the hypothesis empirically. Fama (1965) used the common statistical techniques such as serial correlations and analysis of runs of consecutive price changes of the same sign. Some studies had also employed spectral analysis for testing the random walk model. Another approach aimed at directly testing the independence hypothesis using various mechanical trading rules (for example, filter rules) to examine whether or not profits based on them are greater than they would be under buy-and-hold policy. The rationale behind such an analysis is that if changes in stock prices are random, then filter rules should provide no profit beyond that of a random selection. Later, other advance models such as variance ratio tests, cross-sectional regression, generalized auto-regressive conditional heteroscedasticity (GARCH), auto-regressive integrated moving average (ARIMA) were used to describe the efficiency of stock markets.

According to Fama (1965), the random walk hypothesis states that the future path of the price level of a security is no more predictable than the path of a series of cumulated random numbers. In statistical terms, the hypothesis states that successive price changes are independent, identically distributed random variables so that future price changes cannot be predicted from historical price changes. Mathematically, this model may be expressed in a number of ways but the simplest model is:

$$P_t = P_{t-1} + \varepsilon_t$$

Where, 'p_t' is the price of the stock at time 't', 'P_{t-1}' is the price of the stock in the immediately preceding period and ε_t is a random error.

This study has utilized two traditional models namely, autocorrelation test and runs analysis to test the random walk hypothesis in Nepalese stock market. Further, the descriptive statistics of the returns are also analyzed to identify the distribution character of returns.

Autocorrelation test

Autocorrelation analysis is one of the statistical tools used for measuring possible dependence of successive numbers in a given time series. It has been widely used to measure dependence in successive share price changes as well. Should the successive terms in a price series be non-random, there may be some dependence between them. The autocorrelation coefficient (ρ_k) provides a measure of the relationship between the value of a random variable in time 't' and its value 'k' periods earlier. In other words, it will indicate whether price changes at time 't' is influenced by the price changes occurring 'k' period earlier. For example, for the variable 'μ_t', defined as the change in log price of a given security from the end of the 't-1' to the end of the day 't', the autocorrelation coefficient for lag 'k' is:

$$\rho_k = \frac{Cov\left(\mu_t, u_{t-k}\right)}{Var\left(\mu_t\right)}$$

If the distribution of 'μ_t' has finite variance, then in very large samples the standard error of ρ_k will be given by:

$$\sigma(\rho_k) = \sqrt{\frac{1}{N}}$$

Where, 'N' is the sample size.

Autocorrelation test is a reliable measure for testing of either dependence or independence of random variables in a series. Kendall (1948) computed the price changes at different lagged 1,2,3,4,… time periods. Later the test is used very popularly (e.g. Laurence, 1986; Claessens et al.*, 1995; Poshokwale, 1996; Nicolaas, 1997; Nourredine Khaba, 1998). The autocorrelation coefficient measures the relationship between the values of a random variable at time 't' and its value in the previous period. Autocorrelation test evidences whether the correlation coefficients are significantly different from zero.*

The statistical significance of any 'ρ_k' can be judged by its standard error. A time series is purely random, that is, it exhibits white noise, when the sample autocorrelation coefficients ρ_k are approximately:

$$\rho_k \approx N\,(0,\ 1/n)$$

That is, in the large samples the sample autocorrelation coefficients are normally distributed with zero mean and variance equal to one over the sample size. Instead of testing the statistical significance of any individual autocorrelation coefficient, this study has tested the joint hypothesis that all the ρ_k up to certain lags is simultaneously equal to zero. This can be done by using the Ljung-Box (LB) statistic developed by G.M. Ljung and G. P. E. Box, which is defined as:

$$LB = n(n+2)\sum_{k=1}^{m} \rho_k^2 \big/ (n-k) \approx \chi^2$$

Where n = sample size and k = lag length. The LB-statistic is distributed as Chi-square (χ^2) with k degrees of freedom. The null hypothesis of independence is rejected if LB-statistic is greater than χ^2 with k degrees of freedom at the corresponding significance level (α). Taylor (1986), Young (1987) and Schwert (1990) used this statistic successfully. In this study, autocorrelation coefficient up to 30 lags is computed. The choice of lag *length is consistent with Fama (1965), Gupta (1978), Wong and Kwong (1984) for daily return series and Dickinson and Muragu (1994) for weekly return series.*

Runs test

Statistical tests based on theory of runs, the next model used by the Fama (1965), ignore absolute values in a time series and observe only signs. That is, they are essentially concerned with the direction of changes in a given time series. Thus, for the present purposes, a run may be defined as a sequence of price changes of the same sign preceded and followed by price changes of different sign. In a given share price series, there are three possible type of price changes, namely negative, positive and no change, thus implying three types of runs. Therefore, a plus run of length 'i' can be defined as a sequence of positive price changes preceded and succeeded by either negative or zero price change. Similarly, a minus run of length 'i' can be defined as a sequence of negative price changes which is preceded and followed by either a positive or zero price change. A no change run can also be similarly defined. Thus, for purposes of runs analysis, the series of changes is first replaced by the series of symbols, namely +, - and 0, depending upon whether such changes are positive, negative or zero and then runs are counted. For example, the sequence, + + + - 0 – would be considered to consists of four runs.

Runs analysis becomes important to test the randomness of changes in share prices. Share price movements may be random most of the time but occasionally become serially correlated for varying periods of time, and such dependence may not be detected by serial correlations. Besides, serial correlation coefficients may be dominated by a few unusual or extreme price changes. Brealey (1969), for instance, notes that it may be possible that a tendency towards a coherent pattern of price changes is being obscured by one or two instances in which a very large price rise is succeeded by a corresponding severe fall. In addition, runs test are also useful in discovering the presence of occasional non-random trends in a price series. That is, runs analysis will indicate whether there is "clustering" of like observations in the series which in turn may help detect the existence of a trend. In *that case a given price series would exhibit only few runs. Indeed, if the number of runs is very large, short period price movements may influence the series systematically (Conrad and Juttner, 1973). Non-parametric in nature as these tests are, they do not depend on the finite variance assumption of the price changes. As such, they are particularly suitable for testing the random walk hypothesis.*

A runs test is performed by comparing the actual number of runs with the expected number of runs on the assumption that price changes are independent. If the observed runs are not significantly different from the expected number of runs then it is inferred that successive price changes are independent. On the contrary, if this difference were statistically significant, the series of price changes would be regarded as dependent. Thus, a lower than expected number of runs indicates markets over reaction to information, subsequently reversed, while higher number of runs reflects a lagged response to information. Either situation would suggest an opportunity to make excess returns.

To perform this test 'N' is assigned to total number of observations. Each return that equals or exceeds the mean value is denoted by 'N_1' and items those are below the mean by 'N_2'. The test statistic is 'R', the total number of runs. For a large sample size, that is when 'N_1' and 'N_2' are greater than twenty; the test statistic is approximately normally distributed.

$$z = \frac{R - E(R)}{\sigma_R^2}$$

Where,

$$E(R) = \frac{2N_1N_2}{N} + 1, \text{ and}$$

$$\sigma_R^2 = \sqrt{\frac{2N_1N_2(2N_1N_2 - N)}{N^2(N-1)}}$$

and, $N = N_1 + N_2$

The runs test converts the total number of runs into a z-statistic. For large samples, the z-statistics gives the probability of difference between the actual and expected number of runs. The z-value greater than or equal to ± 1.96 rejects the null hypothesis at 5 percent level of significance.

To sum, recent approaches to the study of the predictability of stock market returns in developed markets have included variance ratios model (Lo and MacKinlay, 1988), and cross sectional regression (Jegadeesh, 1990), unit root test and autoregressive models. These models have been used to challenge the robustness of the random walk model of weak-form efficiency. While the development and application of newer models is academically appealing, the traditional models are used in this study for three reasons:

Firstly, the findings concerning the validity of the weak-form EMH obtained from the use of traditional statistical methodologies still hold as strongly as they did in the 1960s in spite of the challenges from the use of new methodologies.

Secondly, given the large body of evidence on efficiency in developed markets there is a need for 'triangulation' in the research by providing evidence from developing markets. Triangulation can be theoretical or implemental through the use of different research methods, different settings, different data, different assumptions, and improved decision making techniques and so forth. The extent to which triangulation produces similar results can be used as a measure of confidence in the findings, and in the validity of the underlying theory of stock prices particularly in developing countries.

Thirdly, there is a need to set a base for developing stock price research in small stock markets like that of Nepal.

3.3.2 Nature and sources of data

There is no doubt that many studies on market efficiency have had to contend with significant data problems. The non-availability of computerized databases has had a significantly limiting effect on market studies in developing countries, and consequently *on the volume of published evidence. The problems of carrying out research without a proper database are well documented in Dryden (1970), Russel (1972) and Solnik (1973). The computer database (e.g. Datastream International) of some emerging markets have become available, and some are only available on a restricted basis nowadays. One approach to this problem has been the use of indices which, for many exchanges, are published and are therefore readily available at low cost (Sharma and Kennedy, 1977; Gandhi* et al.*1980; D'Ambrosio, 1980; and Cooper, 1982). The evidence from the indices, although not without limitations, is of considerable value.*

In the absence of an established database, considerable time and resources – and therefore costs - are involved in creating one. Even when the costs of acquiring the data can be met, there arises the problem of data availability. This is compounded by:

(i) The lack of awareness by stock exchange officials of the importance of maintaining centralized stock price records,

(ii) The effort required to ensure the completeness and accuracy of the data, and

(iii) The problem arising from thin trading.

Infrequent trading of particular shares can introduce serious biases into the results of empirical study. A major source of possible bias is that prices recorded at the end of a time period may relate to a transaction which occurred earlier in, or even prior to, that period.

In an effort to combat this problem longer time periods, and therefore, more data can be used. Taylor (1986) argues that longer price series improve variance estimates, increase the power of random walk tests, and are essential for the investigation of trading rules. The use of more data may, of course, be too costly an exercise for many researchers with limited budgets and for some markets may even be technically impossible. This may perhaps partly explain the use of monthly returns and relatively short overall time scale of the study when weekly returns are used.

Based on secondary sources, the data on this study are collected from Nepal Stock Exchange, Security Board/ Nepal and individual listed companies. The data used throughout this chapter consists of daily, weekly and monthly market returns as measured by changes in Nepal Stock Exchange index for the period of 1996 to 2005 covering 10 years period. In addition, returns series of 30 listed companies are selected to check the robustness of the results of market returns. The time periods vary from company to company but usually run form 1995 to July 16, 2005. The final date is the same for all companies, but the initial date varies from July 1995 to November 1999.

The number of daily, weekly and monthly observations for market return are 2344, 508 and 120 respectively. The study period and number of observations for listed companies are provided in Table 3.1.

Table 3.1

Study period and number of observations

S. N.	Company	Beginning period	Ending period	Observations		
				Daily	Weekly	Monthly
1	Ace Finance Company (ACEFIN)	*19/07/98*	*11/07/05*	474	204	103
2	Annpurna Finance Company (ANPF)	*31/07/95*	*11/07/05*	375	176	120
3	Bishal Bazar Company (BBC)	*20/07/95*	*16/07/05*	332	159	120
4	Bank of Kathmandu (BOK)	*28/07/97*	*16/07/05*	1343	409	96
5	Citizen Investment Trust (CIT)	*21/03/96*	*16/07/05*	639	291	112
6	Everest Bank Limited (EBL)	*24/06/96*	*16/07/05*	1894	466	111
7	Everest Insurance Co. Ltd. (EICL)	*17/07/95*	*16/07/05*	1014	363	119
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	*19/07/95*	*16/07/05*	516	219	119
9	Harisidhhi Brick & Tile Factory (HBTF)	*17/07/95*	*16/07/05*	593	223	118
10	Himalayan Bank Limited (HBL)	*17/07/95*	*16/07/05*	1765	492	120
11	Himalayan General Ins. Ltd. (HGIC)	*13/08/95*	*16/07/05*	431	213	118
12	Kathmandu Finance Limited (KFL)	*25/07/95*	*16/07/05*	801	321	119
13	Nabil Bank Limited (NABIL)	*27/07/95*	*16/07/05*	2009	504	121
14	National Finance Co. Ltd. (NFCL)	*17/07/95*	*16/07/05*	441	222	119
15	Neco Insurance Co. Ltd. (NEIL)	*27/04/98*	*16/07/05*	438	194	87
16	Nepal Bangladesh Bank Ltd. (NBBL)	*31/12/95*	*14/07/05*	2066	481	115
17	Nepal Finance & Savings Co. Ltd.(NFSC)	*24/08/95*	*16/07/05*	456	201	117
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	*14/05/96*	*16/07/05*	758	208	115
19	Nepal Insurance Co. Ltd. (NICL)	*17/07/95*	*16/07/05*	490	222	119

20	Nepal Investment Bank Limited (NIBL)	*25/07/95*	*16/07/05*	1490	447	120
21	Nepal SBI Bank Limited (SBI)	*17/07/95*	*14/07/05*	2024	496	120
22	NIDC Capital Market Limited (NCML)	*20/07/95*	*16/07/05*	651	287	120
23	People's Finance Limited (PFL)	*29/08/95*	*16/07/05*	824	314	119
24	Premier Insurance Co. Ltd. (PICL)	*17/07/95*	*16/07/05*	953	354	118
25	Soaltee Hotel Limited (SHL)	*17/07/95*	*16/07/05*	487	219	120
26	Standard Chartered Bank Limited (SCBL)	*17/07/95*	*16/07/05*	1902	474	120
27	Taragaon Regency Hotel Ltd. (TRHL)	*22/11/99*	*16/07/05*	603	203	67
28	Uniliver Limited (ULL)	*25/07/95*	*16/07/05*	713	297	120
29	United Insurance Co. Ltd. (UICL)	*17/07/95*	*16/07/05*	897	338	120
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	*06/05/97*	*16/07/05*	450	198	97

Source: Nepal Stock Exchange Limited

The appropriate frequency of observation in a price series depends on the data available and need of the study. The time interval between prices ought to be sufficient to ensure that trade occurs in most intervals and it is preferable that the volume of trade is substantial. This study has used daily index and prices of companies as a main time series variable for analyzing share price behavior in Nepal. A series of daily prices contains useful information that may be missing in a series of weekly or monthly prices. The additional information increases the power of hypothesis test; it improves volatility estimates and it is essential for evaluation of trading rules (Taylor, 2005). Moreover, daily price series were employed by many studies in random walk tests such as Fama (1965), Gupta (1985), Wong and Kwong (1984).

Further, this study has also tested the random behavior of share prices in Nepal by using longer interval data such as weekly and monthly index and prices of listed companies to check the robustness of the results of daily price series. Lo and MacKinlay (1988), Dikison and Muragu (1994) used weekly price series in studying the stochastic behavior of prices. Barnes (1986), Fama and French (1988) employed even longer- term (monthly) price series to examine the predictable component of stock prices.

3.3.3 Selection of enterprises

The focus of this study is to test whether stock market prices contain historical information. The analysis is, therefore, centered on market return series represented by NEPSE index. The robustness of the results of market returns are analyzed further by using returns from listed companies in Nepal Stock Exchange.

While selecting the listed enterprises, extensive editing and validation procedures were undertaken to ensure quality and accuracy. The companies are screened using the variables like market capitalization, volume and frequency of transaction, period covered, continuity of transaction to represent the listed enterprises in Nepal. Since more than 65 percent of the market capitalization consists of banking sector, most of the listed banks are chosen in the samples on the basis of their number of observation. Most of the companies chosen as sample consist of trading history of 10 years. Proper care has been taken to represent all the sectors, as categorized by Nepal Stock Exchange, in samples. The samples include eight commercial banks, three manufacturing and processing companies, two hotels, one trading company, six insurance companies, and 10 finance companies. However, no company is found eligible for selection from 'others' group. Out of 30 sample companies, 20 (67%) companies are classified as 'A' group companies by Nepal Stock Exchange Limited in FY 2004/05. To qualify for selection, the company must have given rise to a minimum of sixty observations to ensure viability of the goodness-of-fit tests. The historical development of listed companies in Nepal along with different sectors has been presented in Table 3.2.

Table 3.2

Historical development of listed companies in Nepal

Fiscal Year	CB	DB	FC	IC	Hotel	MP	Trading	Others	Total
1995/96	8	-	20	-	2	33	22	4	89
1996/97	8	-	25	-	2	34	22	4	95
1997/98	9	-	28	-	2	36	22	4	101
1998/99	9	-	32	-	3	37	22	4	107
1999/00	10	-	34	-	3	37	22	4	110
2000/01	10	-	39	-	3	37	22	4	115
2001/02	12	-	30	11	4	28	8	3	96

2002/03	11	4	35	13	4	29	8	4	108
2003/04	11	4	41	13	4	29	8	4	114
2004/05	14	7	44	14	4	29	8	5	125
Selected companies	8	-	10	6	2	3	1		

In the table, CB stands for commercial banks, DB for development banks, FC for finance companies, IC for insurance companies and MP for manufacturing and processing companies.

While, as will be discussed later, the weaknesses of index series are well known, they have been included in the study for the sake of comparison. Some financial indicators of the selected companies are presented in Appendix-2.

In the past, the random walk studies have employed a variety of data: (a) share price indices, (b) their averages, (c) daily closing prices, (d) week-end closing prices, (e) month end-closing prices, and many others for testing empirical validity of the random walk model to describe price movements in speculative markets. While there has been a growing tendency among the recent studies to use time series of individual share prices, the use of index number is still popular. At the same time the use of index numbers appear to be the most obvious weakness in many of the earlier studies of the random walk hypothesis.

However, individual share price series is preferable to index series for the following reasons:

First, in economic terms, there appears to be little justification for using an index, as it is no more than a measure of general market trends. In contrast, the use of individual share price series ensures that one is studying an understandable and clearly defined market.

Secondly, an index may give a completely false impression of the extent of price fluctuations in individual markets. This is because the process of averaging the price changes of different shares may wash out the individualistic portions of the price changes, leaving only the movement that is common to all shares.

Thirdly, Kendal (1953) has suggested that aggregative index numbers behave more systematically than their components. This might be due to the reduction of the random elements by averaging and the consequent emergence of systematic constituents, but it could equally well be due to chance Therefore, it is quite possible that an index series may exhibit serial dependence even though the individual share price series does not. Hence while interpreting empirical results one should remember limitations of the index series.

3.3.4 The variables

The study mainly considers the daily market return as an individual variable in time series analysis. Weekly and monthly returns of both the market and 30 individual companies are considered as an additional variable to confirm the results of daily market returns. Nepal Stock Exchange prepares daily price index from weighted-average price of daily transaction of each company. Market returns (R_{mt}) are calculated from the closing prices and indices with adjustment of dividends. The share price index i.e. NEPSE includes all stocks listed in Nepal Stock Exchange Limited. However, many studies confirm that their conclusions remain unchanged whether they adjusted their data for dividend or not (for example, Lakonishok and Smidt (1988); Fishe et al. *(1993)). Thus, the return on market for period 't' has been calculated as:*

$$R_{mt} = LN\left[\frac{PI_t}{PI_{t-1}}\right] + D_t$$

Where, R_{mt} = *market return, in period 't';*

PI_t = *Price index at day 't';*

PI_{t-1} = *The price index at period 't-1'*

LN = *Natural system of logarithms*

D_t = *Dividend yield*

The logarithmic transformation is justified on two grounds: (1) Absolute price changes suffer the disadvantage that they are to some extent dependent on the actual price level of the stock. (2) The change in the natural logarithms of the price of a stock is *the yield with continuous compounding from holding that stock over the period of time the change is measured. This may be demonstrated very simply. The sum to which 'P' rupees will amount after 't' periods at a continuous rate of return 'r' is*

$$A = P\ exp\ (r_t)$$

After one time period where t =1

$$A = P\ exp\ (r)$$

We know that,

$$\frac{P_t}{P_{t-1}} = \exp\left(\log_e \frac{P_t}{P_{t-1}}\right)$$

$$P_t = P_{t-1} \exp\left(\log_e \frac{P_t}{P_{t-1}}\right)$$

$$r = \log_e \frac{P_t}{P_{t-1}} = \log P_t - \log P_{t-1}$$

Similarly, return on individual companies' shares are computed using the following equation:

$$r_{it} = LN\left(\frac{P_t + D_t}{P_{t-1}}\right)$$

Where, R_{it} = *Natural logarithm of returns on individual security 'i',*

P_t = *Daily price per share at time 't'*

P_{t-1} = *Daily price per share at time 't-1'*

D_t = *Dividend per share of an individual security 'i'*

The reasons to take logarithm returns are justified by both theoretically and empirically. Theoretically, logarithmic returns are analytically more tractable when linking together sub-period returns to form returns over longer intervals. Empirically, *logarithmic returns are more likely to be normally distributed which is prior condition of standard statistical techniques (Strong, 1992). Further, there are three main reasons for using changes in log price rather than simple price changes:*

First, the change in log price is the yield, with continuous compounding, from holding the security for that period.

Second, Moore (1962) has shown that the variability of simple price changes for a given stock is an increasing function of the price level of the stock. The study indicated that taking logarithms seems to neutralize most of this price level effect.

Third, for changes less than ±15 percent the change in log price is very close to the percentage price change, and for many purposes it is convenient to look at the data in terms of percentage price changes.

3.3.5 The hypotheses

An attempt has been made to test the following hypotheses related to random walk model:

- *The returns generated from the price series (of market and individual companies) are normally distributed.*
- *The successive returns (thus prices) are independent of historical prices. Thus, there exists no autocorrelation in various lags.*
- *The expected and observed number of runs in the return series is uniform. In other words, the return series are random.*

The hypothesis tested was that the correlation coefficients of successive price returns on the NEPSE at all lags are zero. In independence tests, for example, the results have on occasion been generalized on the basis of findings from first order serial correlations. The results at lag 1 may suggest serial independence or dependence, but it *is obviously desirable to extend investigation to lags other than one. This study examines the serial coefficients across 30 lags, which is consistent with Dickinson & Muragu (1994), Cooper (1982) and Taylor (1986). Taylor (1986) recognized that many studies both for developed and emerging markets that had estimated coefficient for more than one lag had failed to apply appropriate statistics for interpreting the joint significance of the results across lags.*

To summarize, the EMH is often investigated by examining whether stock prices exhibit patterns that can predict future prices leading to abnormal profits. For a market to be efficient no such patterns should exist and prices should follow a random walk. Therefore, the weak form efficiency of the stock market in Nepal is analyzed with return series in different time intervals as well as returns of index and individual companies listed in NEPSE.

3.4 Analysis of data

The purpose of this section is to provide the empirical results of random walk test in Nepalese stock market. The analysis consist of: (i) statistical properties of market returns and returns on individual companies aimed to identify the distribution character, (ii) results of the parametric test of serial dependence of returns by using autocorrelation function, and (iii) patterns of the price dependence that could not be detected by parametric test using runs analysis (a non - parametric test).

3.4.1 Statistical properties of market return series

One of the basic assumptions of random walk model is that the stock returns are normally distributed. As Fama (1965) pointed out that theory of random walk on stock prices is based on two hypotheses: (1) successive price changes in individual security are independent, and (2) the price changes conform to some probability distribution. Table 3.3 provides the statistical properties of market returns as measured by NEPSE index. The descriptive statistics contains the number of observations, the mean return for the *period and maximum and minimum returns observed for each of the series. It also includes the standard deviations of the returns series to measure the volatility. The third and fourth moments were measured by skewness and kurtosis coefficients and are reported for each return series. Both of these coefficients help to identify the distribution character of the return series. Moreover, Jarque-Bera test is also used to confirm the distribution character of NEPSE returns series.*

Table 3.3

Descriptive statistics of market returns

The data for this table are colleted and compiled from the Nepal Stock Exchange Limited files for the period 1995-2005. The return is calculated as the change in the last closing index for NEPSE of a day (week or month) from the previous days (week or month) last closing index plus any dividend yield. In the table, N represents number of observations and mean, max. and min. for average, maximum and minimum market returns respectively for the period. SD stands for standard deviation of the returns. SK is a measure of skewness and KURT represents kurtosis. A random walk test assumes that the return series follow normal distribution characterized by zero skewness and kurtosis value equal to 3. The Jarque-Bera (JB) test of normality is the test of the joint hypothesis that SK and KURT are 0 and 3, respectively. In that case, the value of the JB statistic is expected to be zero. JB is defined as $JB = n[\frac{s^2}{6} + \frac{(k-3)^2}{24}]$. *Any p-value less than 0.05 indicate that the distribution is not normal. The JB - statistic with * indicates that the distribution is significantly different from normal distribution.*

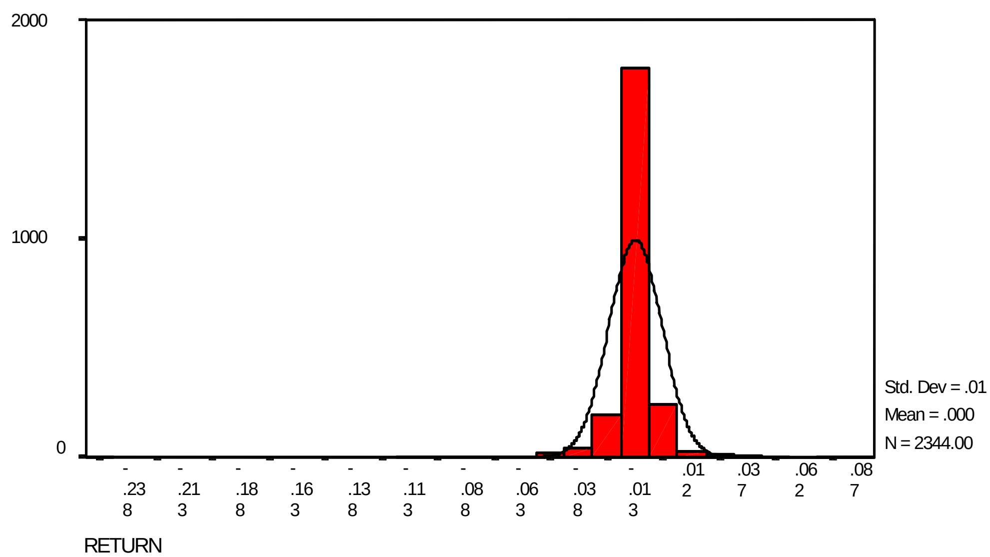
Return Series	N	Mean (%)	Max (%)	Min (%)	SD (%)	SK	KURT	Jarque-Bera
Daily	2344	0.02	10.03	-24.34	1.17	-3.85	98.05	888271.0*
Weekly	508	0.13	15.45	-24.70	2.77	-0.86	19.25	5653.4*
Monthly	120	0.57	17.51	-22.09	5.38	-0.56	5.62	40.5*

* Significant at 5 percent

The average daily market return for the period is 0.02 percent with standard deviation of 1.17 percent. The maximum and minimum returns observed are 10.03 percent and –24.34 percent respectively. The Table 3.3 shows that returns of the Nepalese stock market are not normally distributed. The skewness coefficient of the market return is negative 3.85 and kurtosis coefficient is 98.05. The skewness coefficient in excess of unity is generally taken to be fairly extreme (Chou, 1969). In a Guassian distribution, one would expect these data to have a kurtosis coefficient of 2.902. Kurtosis generally either much higher or lower indicates extreme leptokurtic or extreme platykurtic (Parkinson, 1987). The kurtosis coefficient of 98.05 lies under the extreme leptokurtic distribution. Generally, the distribution is perfectly normally distributed if skewness and kurtosis coefficients are zero and 3 respectively. Thus, daily market return series is not normally distributed.

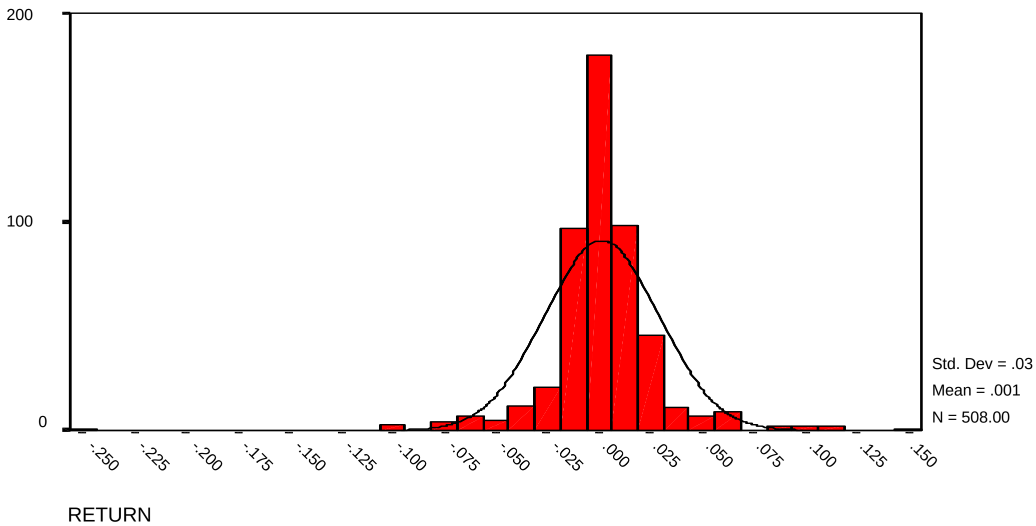
Figure 3.1 provides a better insight into the nature of the departures from normality in the distribution of returns. The dashed curve represents the unit normal density function, whereas the histogram represents the general shape of the empirical distribution. The negative skewness and leptokurtic shape of the histogram indicates a consistent departure from normal distribution.

Figure 3.1: Daily market returns



Similarly, mean weekly return on market for the period is 0.13 percent. The maximum and minimum weekly returns on market index series are observed 15.45 percent and –24.7 percent respectively during the period. The standard deviation of the weekly return series is 2.77 percent. The skewness and kurtosis of the weekly market return series are –0.86 and 19.25 respectively. Both of these coefficients are far from skewness coefficient of zero and kurtosis coefficient of three indicating that market returns based on weekly observations are not normally distributed. Figure 3.2 depicts the weekly market return that shows departure from normal distribution. Though the histogram exhibits less negative skewed and lower peaks than in daily market return, still there is not perfect normal distribution.

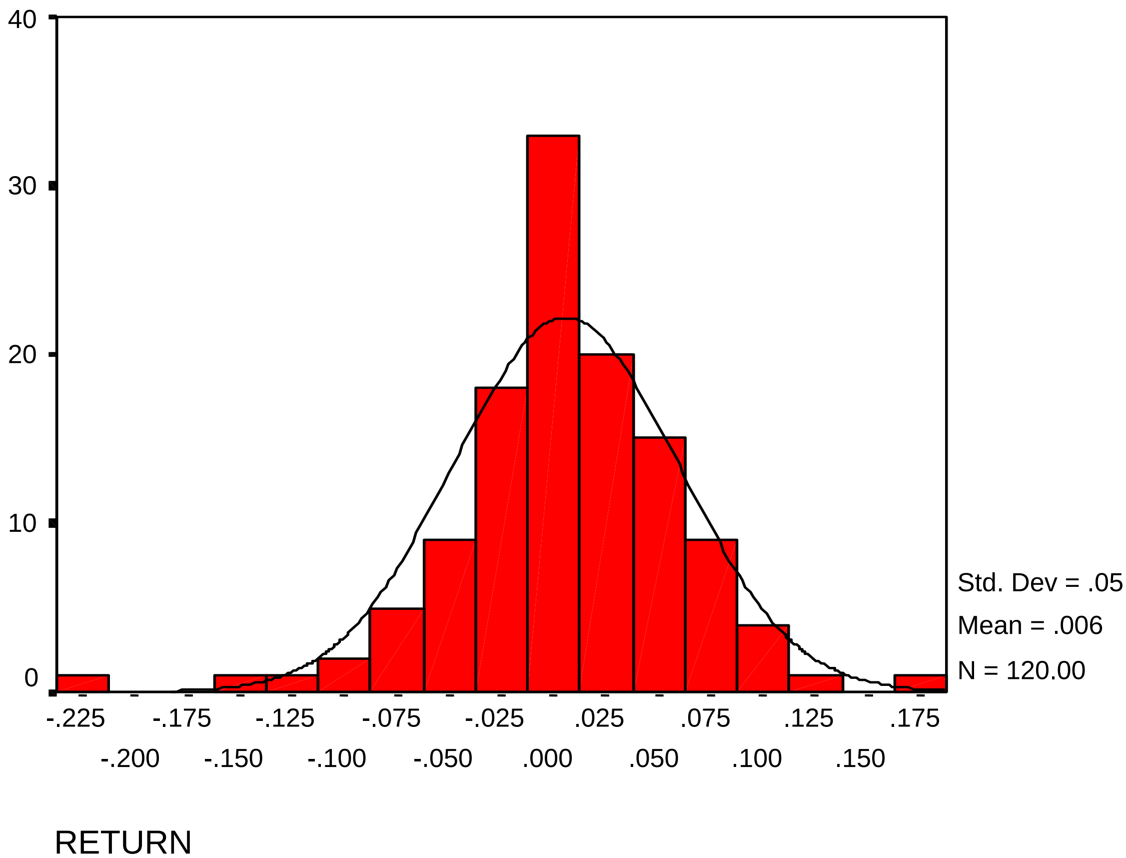
Figure 3.2: Weekly market returns



Further, the mean monthly market return is 0.57 percent. The maximum and minimum monthly returns are reported as 17.51 percent and –22.09 percent respectively. The monthly market return is highly volatile as standard deviation is 5.38 percent. The skewness coefficient of –0.56 and kurtosis coefficient of 5.62 confirms that the monthly market return series is not normally distributed. Figure 3.3 provides further insight into the nature of distribution of monthly market return. Comparing to daily and weekly returns, monthly market return are more proximity with normal distribution. Still the returns are negatively skewed and leptokurtic.

The average weekly market return is 6.5 times of average daily market return and average monthly return is 28.5 times of average daily return. On the other hand, mean monthly return is 4.38 times of mean weekly return. As measured by standard deviation, monthly return series are more volatile than the daily and weekly return series. All the daily, weekly and monthly market return series are negatively skewed and leptokurtic. The descriptive statistics, thus, confirm the non-normal character of the market return series on daily, weekly and monthly frequency of return data.

Figure 3.3: Monthly market returns



Further, the table provides that the Jarque - Bera (JB) statistics for all the market return series are significant. The null hypothesis in this case was that return series were normally distributed. Increasingly large significance values of the JB-statistic for all market return series support that market return for daily, weekly and monthly intervals do not constitute normal distribution.

The results of this study are in consistent with other studies as well. Fama (1965) showed that the distribution of both daily and monthly returns of Dow Jones and New York Stock Exchange (NYSE) indices depart from normal distribution and are negatively skewed, leptokurtic and volatility clustered. Campbell et al. *(1997) concluded that daily U.S. stock indexes show negative skewness and positive excess kurtosis. Bekaeret* et al. *(1998) provide evidence that 17 out of 20 emerging countries examined had positive* *skewness and 19 out of 20 had excess kurtosis, so that normal distribution was rejected for majority of the sample companies.*

3.4.2 Statistical properties of return of individual companies

Table 3.4 provides the statistical properties of daily returns of the sample companies. Out of the 30 stocks included in the sample the highest mean daily return is observed for ACEFIN (0.34 percent) followed by UFCML (0.30 percent), NHDFC (0.26 percent), ANPF and ULL (0.23 percent) and CIT (0.18 percent). The lowest mean daily return observed for HBTF (–0.24 percent) respectively. There are seven companies that recorded negative mean return whereas 23 companies produce positive mean return.

Table 3.5 provides frequency distribution of mean daily return of the individual companies. The mean daily return of the majority of the companies (44 percent) centered within class interval of zero to 0.10 percent. The mean daily return of the 20 percent companies range within 0.10 to 0.20 percent. On the other hand, 10 percent companies lie within the range of –0.10 percent to zero percent return interval.

Table 3.4

Descriptive statistics: daily returns of individual companies

The data for this table are collected and compiled from the Nepal Stock Exchange Limited and individual companies for the period 1995-2005. The table reports descriptive statistics of daily returns series of sample companies. Return is calculated as the change in the last closing price of a day from the previous days last closing price plus any dividend yield. In the table, N represents number of observations and mean, max. and min. for average, maximum and minimum market returns respectively for the period. SD stands for standard deviation of the returns. SK is a measure of skewness and KURT represents kurtosis. A random walk test assumes that the return series follow normal distribution characterized by zero skewness and kurtosis value equal to 3. The JB test of normality is the test of the joint hypothesis that SK and KURT are 0 and 3, respectively. In that case the value of the JB statistic is expected to be zero. JB is defined as $JB = n[\frac{s^2}{6} + \frac{(k-3)^2}{24}]$. *Any p-value less than 0.05 indicate that the distribution is not normal. The JB - statistic with * indicates that the distribution is significantly different from normal distribution.*

S N	Company	N	Mean (%)	Max (%)	Min (%)	SD (%)	SK	KURT	Jarque-Bera
1	Ace Finance Company (ACEFIN)	474	0.34	18.72	-40.54	4.23	-2.07	24.90	9,811*
2	Annpurna Finance Company (ANPF)	375	0.23	23.63	-54.37	6.40	-3.39	29.27	11,507*
3	Bishal Bazar Company (BBC)	332	0.05	9.53	-27.54	4.46	-0.84	7.28	292*
4	Bank of Kathmandu (BOK)	1343	0.04	19.54	-59.39	2.93	-6.55	137.68	1,024,688*
5	Citizen Investment Trust (CIT)	639	0.18	13.58	-15.86	3.31	-0.13	6.33	298*
6	Everest Bank Limited (EBL)	1894	0.11	82.39	-35.28	3.37	6.52	201.36	3,118,589*
7	Everest Insurance Co. Ltd. (EICL)	1014	0.11	13.81	-61.90	3.50	-5.61	100.91	410,425*
8	Gorakhkali Rubber Ud. Ltd.(GRUL)	516	-0.09	13.81	-23.63	4.56	-0.76	6.34	289*
9	Harisidhhi Brick & Tile Fac. (HBTF)	593	-0.24	18.23	-15.41	4.42	-0.14	4.92	93*
10	Himalayan Bank Limited (HBL)	1765	0.03	12.28	-49.87	2.93	-5.99	88.85	552,653*
11	Himalayan General Ins. Ltd. (HGIC)	431	0.06	14.98	-19.41	3.51	-0.33	7.54	378*
12	Kathmandu Finance Limited (KFL)	801	0.10	20.38	-28.89	4.09	-0.39	10.21	1,757*
13	Nabil Bank Limited (NABIL)	2009	0.06	15.90	-66.29	2.67	-9.13	213.09	3,722,838*
14	National Finance Co. Ltd. (NFCL)	441	0.12	14.10	-21.11	3.92	-0.31	7.00	302*
15	Neco Insurance Co. Ltd. (NEIL)	438	0.07	14.60	-13.10	3.25	-0.01	6.14	179*
16	Nepal Bangladesh Bank Ltd. (NBBL)	2066	0.03	27.76	-74.32	3.23	-7.24	160.98	2,166,610*
17	Nepal Fin.&Savings Co. Ltd.(NFSC)	456	0.14	18.30	-68.51	5.52	-4.06	54.73	52,095*
18	Nepal Hou.& Dev. Fin. Co. (NHDFC)	758	0.26	31.67	-19.23	3.63	0.73	14.70	4,395*
19	Nepal Insurance Co. Ltd. (NICL)	490	-0.01	11.77	-39.30	3.90	-2.34	26.43	11,663*
20	Nepal Investment Bank Ltd (NIBL)	1490	0.03	34.73	-59.33	3.44	-5.48	100.59	598,762*
21	Nepal SBI Bank Limited (SBI)	2024	-0.01	12.87	-100.55	3.37	-16.20	446.47	16,674,635*
22	NIDC Capital Market Limited (NCML)	651	-0.01	16.25	-59.78	4.77	-2.99	41.16	40,491*
23	People's Finance Limited (PFL)	824	0.02	85.27	-85.27	5.28	-0.01	166.67	919,812*
24	Premier Insurance Co. Ltd. (PICL)	953	0.06	21.07	-17.43	3.28	-0.01	9.31	1,578*
25	Soaltee Hotel Limited (SHL)	487	-0.12	27.32	-46.10	5.07	-1.66	21.69	7,318*
26	Standard Chartered Bank Ltd (SCBL)	1902	0.08	202.15	-201.08	7.74	-0.26	499.19	19,511,901*
27	Taragaon Regency Hotel Ltd (TRHL)	603	-0.17	38.69	-39.55	4.17	-0.29	28.90	16,875*

28	Uniliver Limited (ULL)	713	0.23	25.16	-38.86	3.44	-1.47	32.16	25,520*
29	United Insurance Co. Ltd. (UICL)	897	0.04	27.44	-22.31	3.23	0.11	13.88	4,433*
30	Universal Fin. & Cap. Mkt. Ltd.(UFCML)	450	0.30	14.03	-16.90	4.14	-0.06	5.60	127*

* Significant at 5 percent

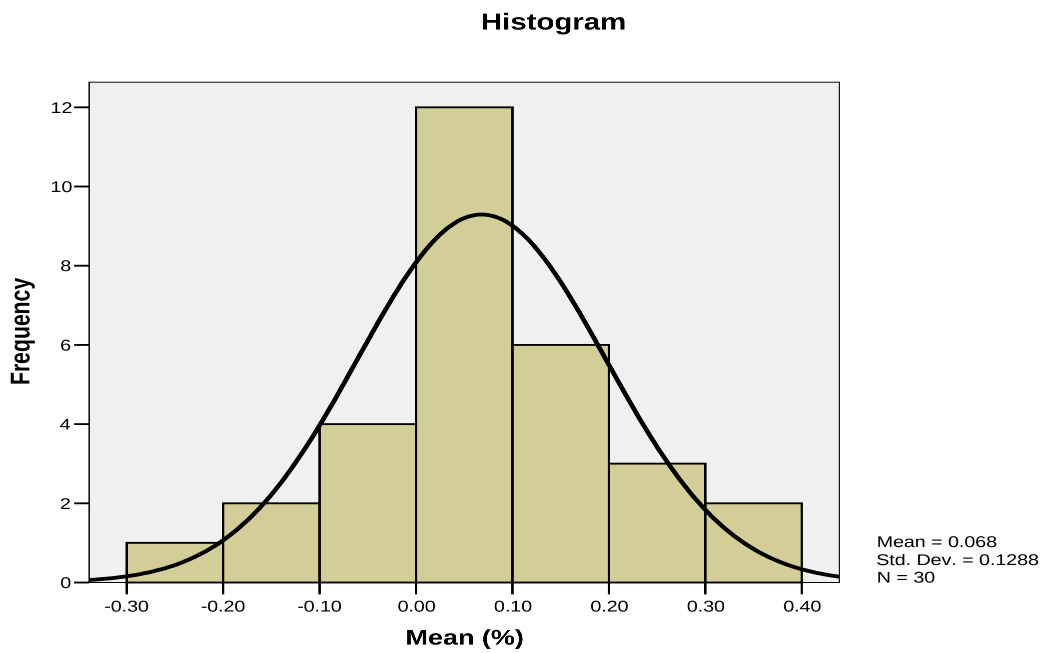
Table 3.5

Frequency distribution of mean daily return of individual companies

Mean daily return	*No. of companies*	*Percentage*
< -0.20	*1*	*3.3*
-0.20 - -0.10	*3*	*10*
-0.10 - 0.00	*3*	*10*
0.00 – 0.10	*13*	*43.4*
0.10 – 0.20	*6*	*20*
0.20 – 0.30	*3*	*10*
> 0.30	*1*	*3.3*
Total	*30*	*100*

Figure 3.4 depicts the histogram of frequency distribution of the mean daily return of the individual companies. The figurer shows that the daily return is distributed within the range of –0.25 percent to 0.35 percent. The return of majority of companies is centered on the zero percent to 15 percent. The figure also shows that most of the companies are yielding positive returns with an average of 0.07 percent and standard deviation of 0.10 percent.

Figure 3.4: Frequency distribution of mean daily return of individual companies



Similarly, the highest maximum return is observed for SCBL (202.15 percent) followed by PFL (85.27 percent), EBL (82.39 percent), TRHL (38.69 percent), NIBL (34.73), and NHDFC (31.67 percent). The lowest maximum return was observed for BBC (9.53 percent). Further, the highest minimum return is reported for SCBL (-201.08 percent) followed by SBI (-100.55 percent), PFL (-85.27 percent), NBBL (-74.32 percent), NFSC (-68.51 percent) and NABIL (-66.29 percent). The lowest minimum return was observed for NEIL (-13.10 percent).

The fluctuation in market prices of the listed companies as measured by standard deviation is recorded highest for SCBL (7.74 percent) followed by ANPF (6.4 percent), NFSC (5.52 percent), PFL (5.28 percent), SHL (5.07 percent) and NCML (4.77 percent). The lowest volatility was observed for NABIL (2.67 percent).

The returns of 27 companies (90 percent) are negatively skewed. The positive skewness coefficients are observed only for EBL, NHDFC and UICL. The kurtosis coefficients of all 30 companies are greater than three indicating that the returns on these *companies are leptokurtic. The highest kurtosis coefficient is observed for SCBL followed by SBI, NABIL, EBL, PFL and NBBL.*

Thus, the non-normal distribution aspects of the market return series are also supported by the return on individual companies. The Jarque - Bera statistics of returns for all the companies are significant with p-value equal to zero evidenced further that general market character of daily return series are not normal.

The weekly return series of 30 selected companies are presented in Table 3.6. Unlike daily returns, the highest mean weekly return is observed for ANPF (1.12 percent) followed by ACEFIN (0.8 percent), UFCML (0.7 percent), ULL (0.56 percent), EBL (0.45 percent) and CIT (0.4 percent). As in daily returns, HBTF reports lowest return (–0.62 percent). There are eight companies whose returns were negative where as 22 companies report positive mean return.

Table 3.6

Descriptive statistics: weekly returns of individual companies

The data for this table are collected and compiled from the Nepal Stock Exchange Limited and individual companies for the period 1995-2005. The table reports descriptive statistics of weekly returns series of individual companies. Return is calculated as the change in the last closing price of a week from the previous week's last closing price plus any dividend yield. In the table, N represents number of observations and mean, max. and min. for average, maximum and minimum market returns respectively for the period. SD stands for standard deviation of the returns. SK is a measure of skewness and KURT represents kurtosis. A random walk test assumes that the return series follow normal distribution characterized by zero skewness and kurtosis value equal to 3. The JB test of normality is the test of the joint hypothesis that SK and KURT are 0 and 3, respectively. In that case the value of the JB statistic is expected to be zero. JB is defined as $JB = n[\frac{s^2}{6} + \frac{(k-3)^2}{24}]$. *Any p-value less than 0.05 indicate that the distribution is not normal. The JB - statistic with * indicates that the distribution is significantly different from normal distribution.*

SN	Company	N	Mean (%)	Max (%)	Min (%)	SD (%)	SK	KURT	Jarque-Bera
1	Ace Finance Company (ACEFIN)	204	0.80	31.23	-40.54	6.48	-0.85	14.16	1,084*
2	Annpurna Finance Company (ANPF)	176	1.12	29.99	-45.95	11.45	-1.55	8.02	110*
3	Bishal Bazar Company (BBC)	159	0.11	19.20	-27.54	5.38	-0.70	7.39	140*
4	Bank of Kathmandu (BOK)	409	0.26	31.23	-57.19	6.66	-1.20	19.36	4,660*
5	Citizen Investment Trust (CIT)	291	0.40	17.11	-22.31	4.83	-0.50	6.54	163*
6	Everest Bank Limited (EBL)	466	0.45	82.39	-28.76	7.42	2.64	36.23	21,996*
7	Everest Insurance Co. Ltd. (EICL)	363	0.29	30.01	-61.90	5.91	3.13	39.49	20,736*
8	Gorakhkali Rubber Ud. Ltd.(GRUL)	219	-0.23	17.52	-38.13	7.04	-0.85	7.05	175*
9	Harisidhhi Brick & Tile Fac. (HBTF)	223	-0.62	31.84	-23.36	6.92	0.44	7.12	165*
10	Himalayan Bank Limited (HBL)	492	0.12	17.38	-45.60	5.59	-2.54	22.15	8,055*
11	Himalayan General Ins. Ltd. (HGIC)	213	0.13	20.06	-19.41	5.09	-0.04	5.94	76*
12	Kathmandu Finance Limited (KFL)	321	0.25	23.18	-37.72	6.15	-0.62	10.83	839*
13	Nabil Bank Limited (NABIL)	504	0.22	36.08	-65.39	5.98	-2.82	37.14	25,149*
14	National Finance Co. Ltd. (NFCL)	222	0.23	24.45	-19.23	5.38	0.37	6.35	109*
15	Neco Insurance Co. Ltd. (NEIL)	194	0.17	18.01	-15.41	4.86	0.32	5.22	43*
16	Nepal Bangladesh Bank Ltd. (NBBL)	481	0.11	27.76	-63.87	7.02	-2.19	21.93	7,569*
17	Nepal Finance & Savings Co. Ltd. (NFSC)	201	-0.31	19.05	-35.28	7.21	-1.29	7.77	246*
18	Nepal Hou.& Dev. Fin. Co. (NHDFC)	208	0.30	29.11	-67.71	7.95	-2.63	28.88	6,047*
19	Nepal Insurance Co. Ltd. (NICL)	222	-0.02	14.66	-32.69	5.04	-1.37	12.17	847*
20	Nepal Investment Bank Ltd (NIBL)	447	0.09	36.96	-55.83	6.56	-1.90	22.77	7,554*
21	Nepal SBI Bank Limited (SBI)	496	-0.04	22.31	-111.51	7.36	-7.57	111.21	246,768*
22	NIDC Capital Market Limited (NCML)	287	-0.01	22.31	-59.78	7.06	-2.21	21.44	4,302*
23	People's Finance Limited (PFL)	314	0.06	85.27	-89.19	8.68	-0.35	66.97	53,552*
24	Premier Insurance Co. Ltd. (PICL)	354	0.15	23.30	-29.11	4.96	-0.41	10.90	931*
25	Soaltee Hotel Limited (SHL)	219	-0.27	27.32	-46.10	7.52	-0.97	11.04	624*
26	Standard Chartered Bank Ltd (SCBL)	474	0.31	26.03	-45.69	5.76	-2.54	24.39	9,547*
27	Taragaon Regency Hotel Ltd (TRHL)	203	-0.50	37.53	-38.88	7.30	-0.18	10.69	502*

28	Uniliver Limited (ULL)	297	0.56	25.41	-29.33	57.60	-0.26	8.63	396*
29	United Insurance Co. Ltd. (UICL)	338	0.11	43.99	-22.31	4.95	1.67	22.33	5,420*
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	198	0.70	27.38	-28.09	6.49	0.15	6.34	93*

* Significant at 5 percent

The frequency distribution of mean weekly returns is presented in Table 3.7. The table shows that mean weekly return of 10 companies (33 percent) lies within the range of zero to 0.20 percent whereas return of nine companies (30 percent) lies between the range of 0.20 to 0.40 percent. Returns of the only five companies (17 percent) are negative.

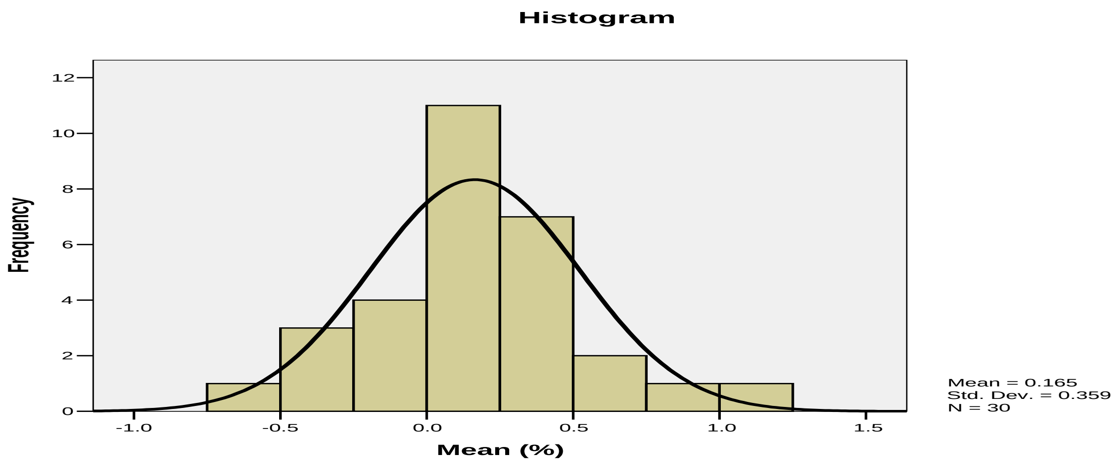
Table 3.7

Frequency distribution of mean weekly return of individual companies

Mean weekly return	*No. of companies*	*Percentage*
< -0.40	*2*	*7*
-0.40 - -0.20	*2*	*7*
-0.20 - 0.00	*1*	*3*
0.00 – 0.20	*10*	*33*
0.20 – 0.40	*9*	*30*
0.40 – 0.60	*2*	*7*
> 0.60	*4*	*13*
Total	*30*	*100*

Figure 3.5 also exhibits the histogram of frequency distribution of mean weekly return of the companies. The figure shows that the returns of the majority of the companies lie within the rage of zero to 0.40 percent. However, some companies (13 percent) are observed to have returns exceeding 0.60 percent. The average weekly return of the companies is 0.16 percent with the standard deviation of 0.36 percent.

Figure 3.5: Frequency distribution of mean weekly return of individual companies



Similarly, the highest maximum returns have been observed for PFL (85.27 percent) followed by EBL (82.39 percent), UICL (43.99 percent), TRHL (37.53 percent), NIBL (36.96 percent) and NABIL (36.08 percent). The lowest maximum return has been observed for NICL (14.66 percent). Further, the highest minimum return has been reported for SBI (-111.51 percent) followed by PFL (-89.19 percent), NFSC (-67.71 percent), NABIL (-65.39 percent), NBBL (-63.87 percent) and EICL (-61.90 percent). The lowest minimum return has been observed for NEIL (-15.41 percent).

Regarding the volatility of returns, the highest standard deviation has been observed for ULL (57.6 percent) followed by ANPF (11.45 percent), PFL (8.68 percent), NFSC (7.95 percent), SHL (7.52 percent) and EBL (7.42 percent). On the other hand, the lowest standard deviation is observed for CIT (4.83 percent).

The weekly returns of twenty-three out of 30 companies are negatively skewed and the returns of all 30 companies are leptokurtic. The positive skewness has been observed for EICL (3.13), EBL (2.64), UICL (1.67), HBTF (0.44), NFCL (0.37), NEIL (0.32), and UFCML (0.15). The highest kurtosis coefficient is observed for SBI (111.21) followed by

PFL (66.97), EICL (34.49), NABIL (37.14), EBL (36.23), and NFSC (28.88). The lowest kurtosis coefficient has been observed for NEIL (5.22).

Likewise in daily returns, the weekly returns of individual companies are not normally distributed. This led further support to the non-normal return distribution of Nepalese stock market. The Jarque-Bera statistics for all the companies return series are significant with p-values equal to zero evidenced further that general market character of weekly return series is not normal.

Table 3.8 reports descriptive statistics of monthly returns of individual companies. Among the 30 selected enterprises, the highest mean monthly return has been observed for EBL (2.05 percent) followed by NHDFC (1.75 percent), ACEFIN (1.59 percent), UFCML (1.53 percent), ULL (1.39 percent) and CIT (1.24 percent). The lowest mean return has been observed for TRHL (-1.68 percent). There are 25 companies that report positive mean returns. Thus, the average return on companies has been improved for longer-term horizon.

Table 3.8

Descriptive statistics: monthly returns of individual companies

The data for this table are collected and compiled from the Nepal Stock Exchange Limited and individual companies for the period 1995-2005. The table reports descriptive statistics of monthly returns series of individual companies. Return is calculated as the change in the last closing price of a month from the previous month last closing price plus any dividend yield. In the table, N represents number of observations and mean, max. and min. for average, maximum and minimum market returns respectively for the period. SD stands for standard deviation of the returns. SK is a measure of skewness and KURT represents kurtosis. A random walk test assumes that the return series follow normal distribution characterized by zero skewness and kurtosis value equal to 3. The JB test of normality is the test of the joint hypothesis that SK and KURT are 0 and 3, respectively. In that case the value of the JB statistic is expected to be zero. JB is defined as $JB = n\left[\frac{s^2}{6} + \frac{(k-3)^2}{24}\right]$. *Any p-value less than 0.05 indicate that the distribution is not normal. The JB - statistic with * indicates that the distribution is significantly different from normal distribution.*

S.N	Company	N	Mean (%)	Max (%)	Min (%)	SD (%)	SK	KURT	Jarque -Bera
1	Ace Finance Company (ACEFIN)	103	1.59	34.90	-40.54	9.65	-0.18	7.35	81*
2	Annpurna Finance Company (ANPF)	120	0.72	26.52	-60.83	11.24	-2.14	13.45	632*
3	Bishal Bazar Company (BBC)	120	0.05	19.03	-30.01	6.02	-1.12	9.36	228*
4	Bank of Kathmandu (BOK)	96	1.09	36.33	-53.34	12.9	-0.99	6.79	73*
5	Citizen Investment Trust (CIT)	112	1.24	31.91	-24.68	7.52	0.42	7.86	113*
6	Everest Bank Limited (EBL)	111	2.05	65.11	-37.34	12.96	0.76	8.04	128*
7	Everest Insurance Co. Ltd. (EICL)	119	0.83	43.44	-61.90	10.54	1.28	14.43	680*
8	Gorakhkali Rubber Ud. Ltd.(GRUL)	119	-0.45	55.65	-32.27	10.87	0.88	9.42	220*
9	Harisidhhi Brick & Tile Fac. (HBTF)	118	-1.16	37.80	-35.13	9.19	0.64	8.82	175*
10	Himalayan Bank Limited (HBL)	120	0.57	25.13	-45.60	10.82	-1.37	7.08	120*
11	Himalayan General Ins. Ltd. (HGIC)	118	0.23	25.19	-29.95	7.87	-0.17	6.54	62*
12	Kathmandu Finance Limited (KFL)	119	0.40	40.54	-28.89	9.85	1.09	7.02	103*
13	Nabil Bank Limited (NABIL)	121	0.93	22.60	-53.20	11.32	-1.97	10.03	325*
14	National Finance Co. Ltd. (NFCL)	119	0.48	22.86	-32.04	7.3	-0.52	6.56	68*
15	Neco Insurance Co. Ltd. (NEIL)	87	0.25	32.35	-23.75	8.41	0.80	6.18	46*
16	Nepal Bangladesh Bank Ltd. (NBBL)	115	0.47	33.21	-47.55	12.66	-0.94	5.64	50*
17	Nepal Fin.&Savings Co. Ltd.(NFSC)	117	0.66	40.29	-68.51	11.69	-1.04	14.22	635*
18	Nepal Hou.& Dev. Fin. Co. (NHDFC)	115	1.75	37.26	-18.61	8.11	1.62	8.14	177*
19	Nepal Insurance Co. Ltd. (NICL)	119	-0.04	20.62	-39.30	7.22	-1.33	10.52	315*
20	Nepal Investment Bank Ltd (NIBL)	120	0.33	34.83	-56.58	11.41	-1.63	9.64	273*
21	Nepal SBI Bank Limited (SBI)	120	-0.09	35.09	-91.62	13.28	-2.63	20.82	1,727*
22	NIDC Capital Market Limited (NCML)	120	0.02	47.95	-74.44	12.72	-1.19	13.15	544*
23	People's Finance Limited (PFL)	119	0.20	85.27	-85.27	14.09	0.36	24.37	2,267*
24	Premier Insurance Co. Ltd. (PICL)	118	0.35	27.44	-22.31	8.97	0.05	4.41	9*
25	Soaltee Hotel Limited (SHL)	120	0.47	27.44	-39.08	8.43	-1.00	8.34	162*
26	Standard Chartered Bank Ltd (SCBL)	120	1.24	23.81	-48.79	11.21	-1.84	9.23	262*

27	Taragaon Regency Hotel Ltd (TRHL)	67	-1.68	37.68	-32.65	10.38	0.49	5.63	22*
28	Uniliver Limited (ULL)	120	1.39	32.85	-27.11	9.17	0.61	5.38	36*
29	United Insurance Co. Ltd. (UICL)	120	0.27	49.75	-16.25	8.24	1.92	12.92	566*
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	97	1.53	55.62	-31.84	11.31	1.02	8.73	149*

* Significant at 5 percent

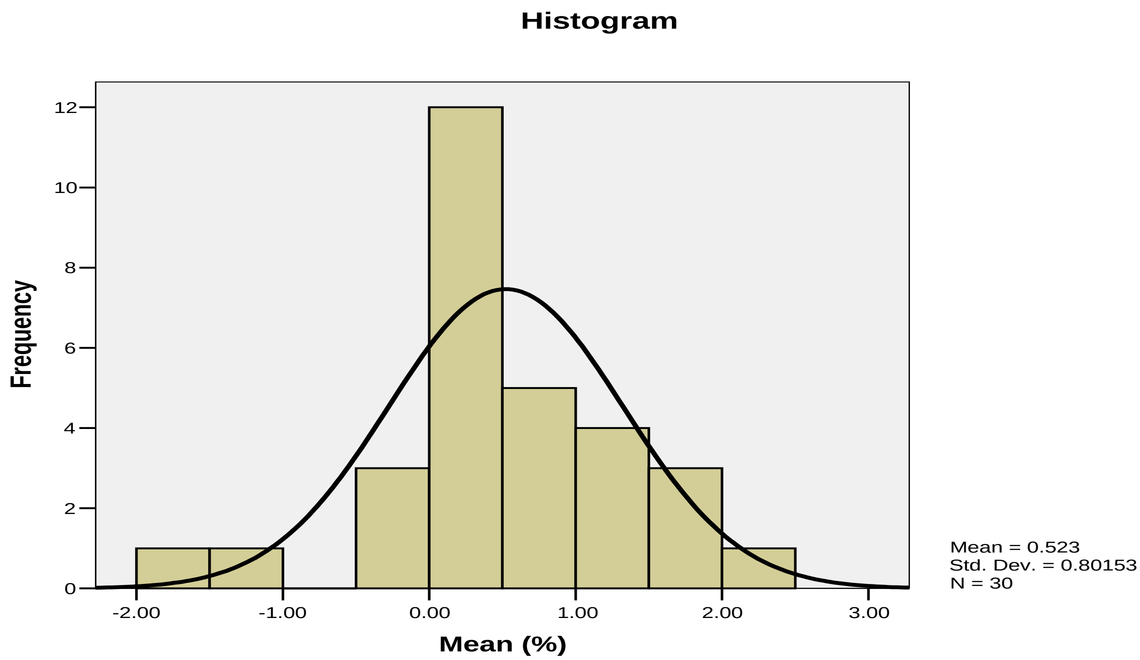
Table 3.9 further highlights the frequency distribution of mean monthly returns of the companies selected for the study. Unlike daily and weekly returns, the range of return widened in monthly returns from –1.68 percent to 2.05 percent. There are 17 companies (57 percent) whose return lies within the interval of zero percent to 1.0 percent. Still, there are majority of companies (83 percent) that yield positive monthly return.

Table 3.9

Frequency distribution of mean monthly return of individual companies

Mean monthly return	*No. of companies*	*Percentage*
< -1.00	*2*	*7*
-1.00 - -0.50	*1*	*3*
-0.50 - 0.00	*2*	*7*
0.00 – 0.50	*12*	*40*
0.50 – 1.00	*5*	*17*
1.00 – 1.50	*4*	*13*
> 1.50	*4*	*13*
Total	*30*	*100*

Figure 3.6: Frequency distribution of mean monthly return of individual companies



The frequency distribution is further exhibited in Figure 3.6. It has been observed that return of majority of the companies (57 percent) lie within the range of zero to 1.0 percent. The mean monthly return of all 30 companies is increased to 0.52 percent. The standard deviation is also increased to 0.80 percent.

The highest maximum return has been reported for PFL (85.27 percent) followed by EBL (65.11 percent), GRUL (55.65 percent) UFCML (55.62 percent), UICL (49.75 percent) and NCML (47.95 percent). The lowest maximum return is observed for BBC (19.03 percent). Similarly, the highest minimum return is observed for SBI (-91.62 percent) followed by PFL (-85.27 percent), NCML (-74.44 percent), NFSC (-68.51 percent), EICL (-61.9 percent) and ANPF (-60.83 percent). The lowest minimum return is observed for NHDFC (-18.61 percent).

The highest volatility in the monthly return, as measured by standard deviation, is observed for PFL (14.09 percent) followed by SBI (13.28 percent), EBL (12.96 percent), BOK (12.90 percent), NCML (12.72 percent) and NBBL (12.66 percent). The third moment of the companies, as reported by skewness coefficient, shows that the return of 16 *companies is negatively skewed. The highest positive skewness coefficient is observed for UICL (1.92) followed by NHDFC (1.62), EICL (1.28), KFL (1.09), UFCML (1.02), and GRUL (0.88). The highest negative skewness coefficient has been observed for SBI (-2.63) followed by ANPF (-2.14), NABIL (-1.97), SCBL (-1.84), NIBL (-1.63), HBL (-1.37) and NICL (-1.33). The table further shows that the returns of all the 30 companies are leptokurtic. The highest kurtosis coefficient is observed for PFL (24.37) followed by EICL (14.43), NFSC (14.22), ANPF (13.45), NCML (13.15) and UICL (12.92).*

To sum, the skewness and kurtosis characteristics of individual companies are presented in Table 3.10. The table shows that majority of daily, weekly and monthly returns are negatively skewed and all the returns are leptokurtic. Thus, the skewness and leptokurtic frequency distribution of stock return series on the NEPSE indicates that the distribution is not normal. In other words, the non-normal frequency distributions of stock return series deviate from the prior condition of random walk model. However, Fama (1965) points out that in the general theory of random walks, the form or shape of the distribution need not be specified. Thus, any distribution is consistent with the theory as long as it correctly characterizes the process generating the price changes.

Table 3.10

Skewness and kurtosis characteristics of individual companies

S.N.	Descriptive	Daily return series	Weekly return series	Monthly return series
1	Skewness (-)	27	23	17
2	Skewness (0)	0	0	0
3	Skewness (+)	3	7	12
	Total	**30**	**30**	**30**
4	Kurtosis (>3)	30	30	30
5	Kurtosis (=3)	0	0	0
6	Kurtosis (<3)	0	0	0
	Total	**30**	**30**	**30**

In addition, Kolmogrov-Smirnov (K-S) Goodness of fit test, a non-parametric test, is also used to analyze the distribution character of returns, which also provides evidence that distribution of returns do not confirm the normal distribution (Appendix-14).

To conclude:

- *In Nepal, whether it is daily or weekly or monthly return, market return as measured by NEPSE index is negatively skewed.*
- *In Nepal, whether it is daily or weekly or monthly returns coefficients of K are all greater than 3.*
- *In Nepal, whether it is daily or weekly or monthly return, the majority of companies' returns is negatively skewed.*

- *In Nepal, the number of negatively skewed companies reduces as the return interval increases.*

- *In Nepal, neither the market return nor an individual company is found to have a zero skewness coefficient.*

- *In Nepal, positive skewness can be observed for daily, weekly and monthly returns. The number of positively skewed companies increased as the return intervals are increased.*

- *In Nepal, whether it is market return or return on individual companies Jarque-Bera values are all significant.*

3.4.3 Autocorrelation function (ACF) test

Autocorrelation test is one of the mechanisms to identify the stochastic process in return series of both the market and individual companies. This test helps to determine whether returns are dependent on their past values. A time series is stationary if its mean, variance and auto covariance (at various lags) remain the same, no matter at what point measure them; that is, they are time invariant. Such a time series tend to return to its mean (called mean reversion). In contrast, non-stationary time series have a time varying mean or a time varying variance or both. The non-stationary series are often termed as random walk. Thus, the autocorrelation function helps to test the randomness of the daily, weekly and monthly return series of stock market as well as the individual companies.

(a) Market return

The overall results of the autocorrelation coefficients for daily, weekly and monthly return on market at one, two, three, four, five, twelve and thirty lags are presented in Table 3.11.

Table 3.11
Autocorrelation function test: market returns

This table presents autocorrelation coefficient of daily, weekly and monthly return on market as measured by NEPSE. The return is computed by taking logarithms of closing prices considering dividend yields, i.e.

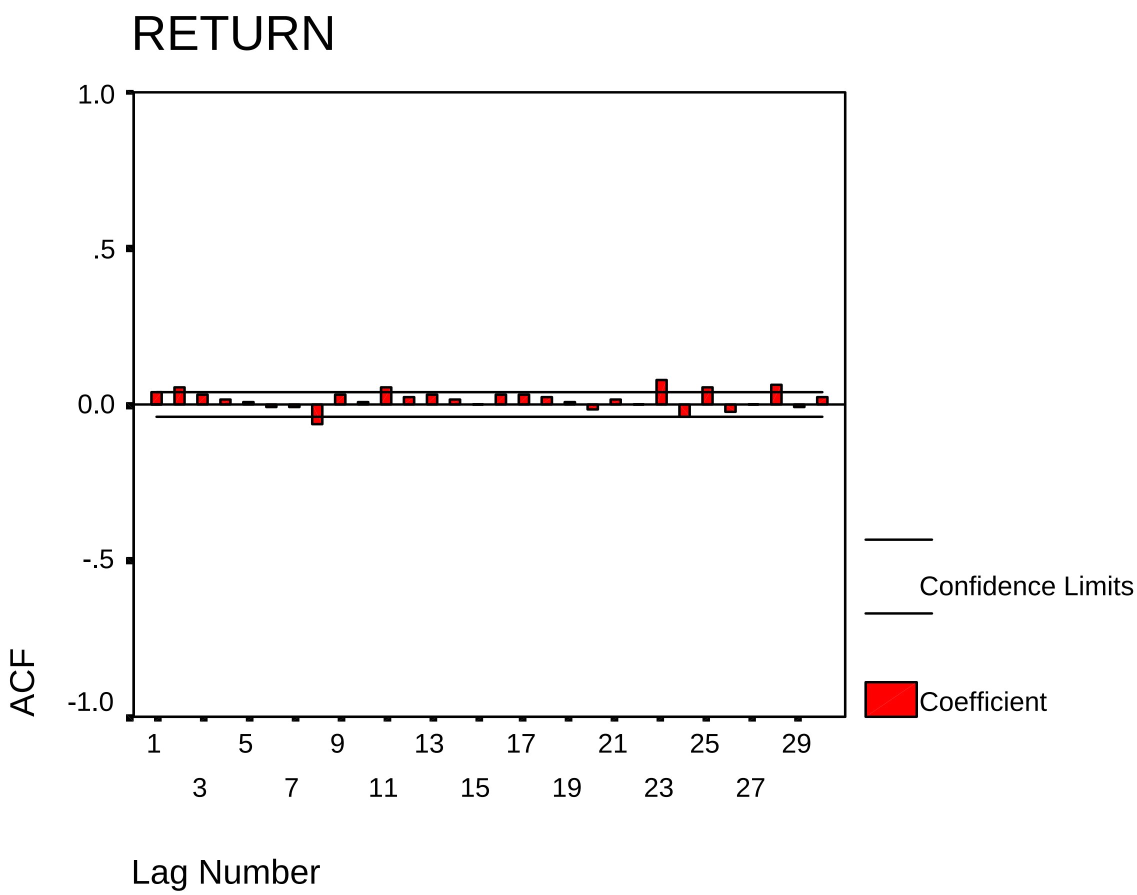
$r_{it} = LN\left(\frac{P_t + D_t}{P_{t-1}}\right)$. The autocorrelation function is a test of stationarity that tests statistical significance of any individual autocorrelation coefficient at certain lag is zero. A zero autocorrelation means the returns in given series are not dependent upon the past return (or lagged values). This confirms the series is non-stationary and thus random. In this table, the joint hypothesis that all the autocorrelation coefficients up to certain lags are simultaneously equal to zero is tested by using Ljung-Box Q-statistic which is defined as $LB = n(n+2)n\sum_{k=1}^{m}\frac{\rho_k^2}{n-k}$. Any p-value less than 0.5 accepts the null hypothesis of randomness (ρ = 0) and p-value greater than 0.05 rejects the null hypothesis implying that the series is stationary. Any autocorrelation coefficient with * indicates the significant value indicating that the series is stationary (non-random) up to that lag.

Return Series	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 12	Lag 30
Daily	0.04	0.06*	0.04*	0.01*	0.01*	0.02*	0.03*
Weekly	-0.07	-0.02	0.13*	0.07*	0.00*	0.04	0.10*
Monthly	0.16	0.18*	0.06	0.09	0.08	-0.07*	-0.18*

* Significant at 5 percent

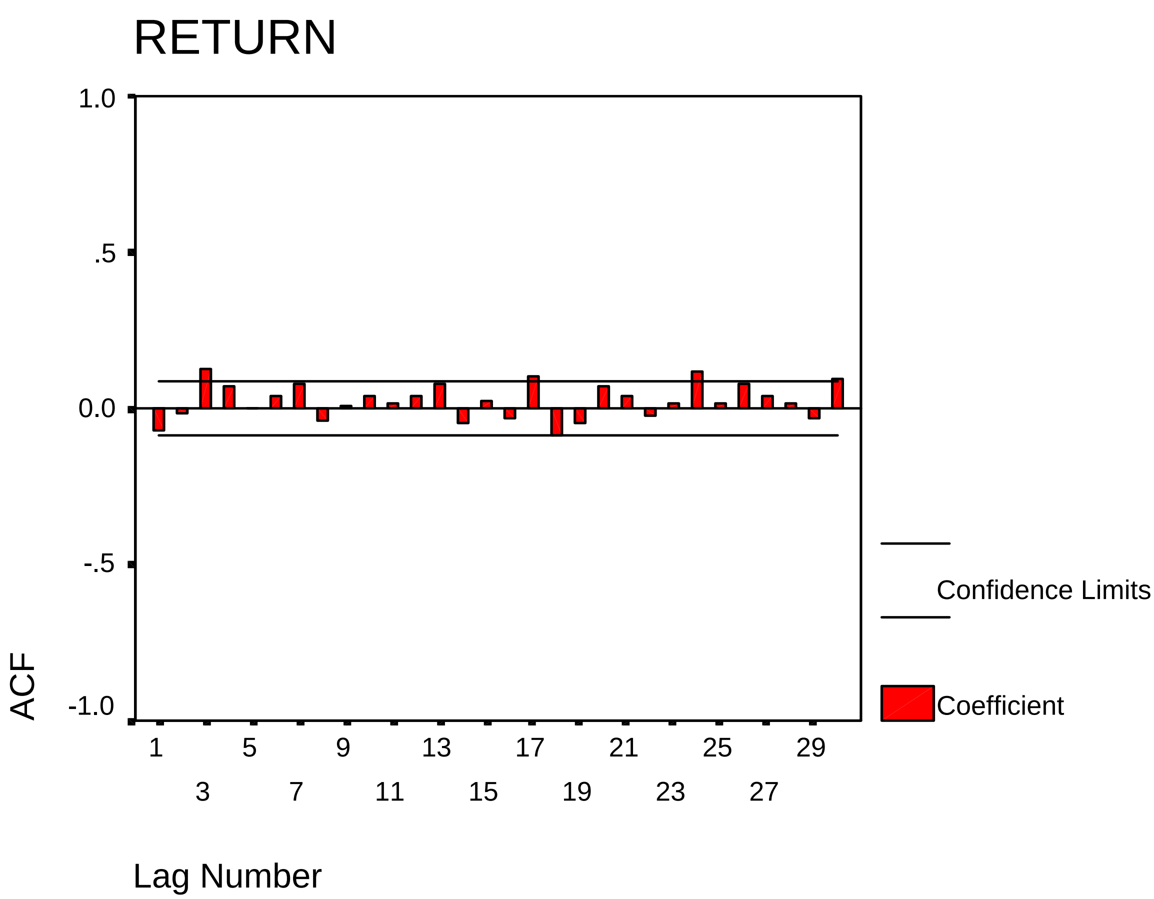
The autocorrelation of daily market return at lag one (first-order autocorrelation) is +0.04. The p-value corresponding to the autocorrelation is 0.057 which is higher than 0.05. Thus, the null hypothesis of autocorrelation being zero at lag one cannot be rejected using the Q-statistic. This indicates that the daily market returns are distributed randomly. However, for other lags (from lag two to 30 lags) the autocorrelation coefficients are significant at 5 percent level. The value of Q-statistic up to lag 12 is 36.62 and up to lag 30 is 84.85. The probabilities of obtaining such a Q-value under the null hypothesis that the sum of 12 and 30 squared autocorrelation coefficients is zero are zero respectively. Out of 30 autocorrelation coefficients, 21 (70%) are found positive. All coefficients (97%) are significant at 2 to 30 lags. The highest positive and negative coefficients are observed at lag two (0.06) and lag eight (-0.06). Though, first order autocorrelation is found to be insignificant, the higher order coefficients are found significantly different from zero indicating the price change during a particular day is correlated with the changes during earlier days except the preceding day (Appendix-20).

Figure 3.4: Autocorrelation function: daily market returns



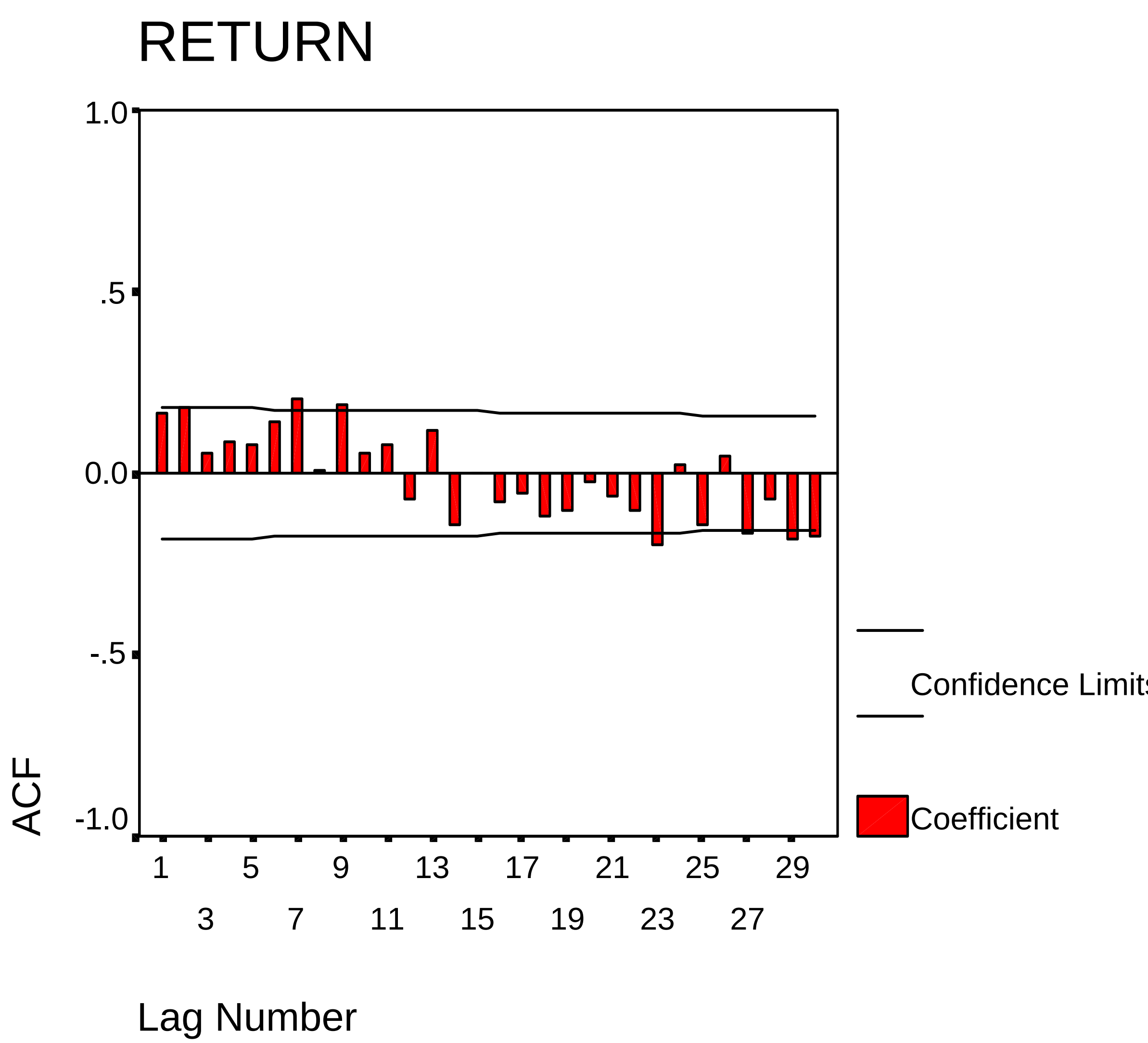
The return behavior of stock market in Nepal is further examined whether price movements over some other time interval, say a week or a month, also confirm the above conclusion. Accordingly, autocorrelation coefficients for lags 1-30 have been computed for NEPSE weekly and monthly index return series. The first and second order coefficients (-0.06 and –0.01 respectively) are found negative and insignificant. Further, the autocorrelation coefficients up to 12 and 16 lags are also found insignificant. However, the coefficients at other lags (up to 30 lags) are found significantly different from zero. Interestingly, as in daily return series 21 coefficients are found positive. However, number of significant coefficients is declined to 26 (87 percent) than that of daily market returns. The magnitudes of the positive and negative coefficients are also increased in weekly market return. The highest positive coefficient is observed at lag 17 (0.10) and highest negative is observed at lag 18 (-0.09). Though large (in absolute values) and statistically significant at almost all cases, the higher order coefficients suggest that price changes during a particular week are correlated with price changes during earlier weeks.

Figure 3.5: Autocorrelation function: weekly market returns



The monthly market returns, on the other hand, reveal that the first order autocorrelation coefficient is 0.16, which is not significant. This supports the results of daily return series. The other coefficients found insignificant are up to lag four, five and six. For remaining lags (up to lag 30), the coefficients are found significantly different than zero. In contrast to the daily and weekly returns, the number of negative coefficients is drastically increased to 15 (50%) out of 30. The number of significant coefficients is *also further declined to 25 (83 percent). Interestingly, the magnitudes of highest positive and negative coefficients are also widened to +0.20 to –0.02 respectively. Taking into consideration the significance of coefficient at lag 30, the monthly return also supports the results of daily and weekly returns suggesting that returns in Nepalese stock market do have predictable patterns.*

Figure 3.6: Autocorrelation function: monthly market returns



The findings show that autocorrelation of daily, weekly and monthly return series up to lag 30 is significant. It indicates that the returns are not random. The implication of *this finding is that stock prices in Nepal can be predicted on the basis of historical observation. An investor can develop investment strategy from the price data to beat the market. In an efficient market, it is assumed that historical prices cannot be used to predict future price movements. However, in Nepalese case, the autocorrelation test does not support this hypothesis and led to conclude that stock market in Nepal is not efficient in weak form.*

In sum, the analysis of daily, weekly and monthly indices, by and large, do not support the applicability of the random walk model as a valid description of share price behavior in Nepal. It should be remembered that a very small serial correlation coefficient could be highly significant statistically but imply dependence which has virtually no significance in terms of economic considerations (Dryden, 1970). However, index return series in Nepal with different intervals show some uniform pattern of serial dependence indicating that investors could predict the returns using the historical price data.

(b) Individual share price series

In general, the index numbers are likely to move systematically than their components. The serial dependence showed by the index series may be due to averaging phenomenon. It is, therefore, desirable to consider actual prices rather than some average or index of these prices. In an attempt to do so, autocorrelation coefficients for 30 individual share prices have been computed for lags 1-30. The results of daily return on individual share prices for lags 1-5, 12 and 30 are presented in Table 3.12.

The table shows that first order auto-correlation coefficients for daily return are negative and statistically significant in majority of the cases. Out of 30 coefficients, the negative coefficients are observed for 19 (64 percent) companies. The significant coefficients are observed for 17 (57 percent) enterprises. The highest positive autocorrelation coefficient has been observed for BOK (0.14) followed by NABIL (0.10), EBL (0.09), NBBL (0.08), UFCML (0.06), and HBTF (0.04). On the other hand, the highest negative first-order autocorrelation coefficient is observed for SCBL (–0.44) followed by PFL (-0.31), BBC (-0.27), SHL (-0.17), NICL (-0.15) and PICL (-0.14).

Table 3.12
Autocorrelation function test: daily return on individual companies

This table presents autocorrelation coefficient of daily return on individual companies. The return is computed by taking logarithms of closing prices considering dividend yields, i.e. $r_{it} = LN\left(\frac{P_t + D_t}{P_{t-1}}\right)$. The autocorrelation function is a test of stationarity that tests statistical significance of any individual autocorrelation coefficient at certain lag is zero. A zero autocorrelation means the returns in given series are not dependent upon the past return (or lagged values). This confirms the series is non-stationary and thus random. In this table, the joint hypothesis that all the autocorrelation coefficients up to certain lags are simultaneously equal to zero is tested by using Ljung-Box Q-statistic, which is defined as $LB = n(n+2)n\sum_{k=1}^{m}\frac{\rho_k^2}{n-k}$. Any p-value greater than 0.5 accepts the null hypothesis of randomness (ρ = 0) and p-value less than 0.05 rejects the null hypothesis implying that the series is stationary. Any autocorrelation coefficient with * indicates the significant value indicating that the series is stationary (non-random) up to that lag.

SN	Company	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 12	Lag 30
1	Ace Finance Company (ACEFIN)	-0.11*	0.13*	0.02*	0.09*	-0.03*	0.01*	0.04
2	Annpurna Finance Company (ANPF)	-0.06	-0.09	0.08	-0.03	-0.08	0.00	0.08
3	Bishal Bazar Company (BBC)	0.14*	0.02*	-0.06*	-0.04*	-0.06*	0.02*	0.04*
4	Bank of Kathmandu (BOK)	-0.27*	0.06*	0.00*	0.05*	0.03*	0.06*	0.01*
5	Citizen Investment Trust (CIT)	-0.12*	0.00*	0.00*	-0.04*	0.05*	0.01	0.03*
6	Everest Bank Limited (EBL)	0.09*	-0.01*	-0.08*	-0.04*	-0.06*	0.01*	-0.01*
7	Everest Insurance Co. Ltd. (EICL)	-0.09*	0.06*	0.08*	0.07*	0.04*	0.00*	-0.01
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	-0.03	0.14*	0.04*	-0.01*	0.07*	0.09*	0.01
9	Harisidhhi Brick & Tile Factory (HBTF)	0.04	0.00	0.03	0.00	-0.02	0.05	-0.04*
10	Himalayan Bank Limited (HBL)	-0.03	0.02	0.02	0.00	-0.06	-0.05	-0.03
11	Himalayan General Ins. Ltd. (HGIC)	0.04	0.13*	0.03	0.06	0.09*	0.01	0.04*
12	Kathmandu Finance Limited (KFL)	-0.09*	0.02*	-0.03	0.04	-0.02	-0.01	0.03*
13	Nabil Bank Limited (NABIL)	0.10*	0.00*	-0.06*	0.00*	-0.04*	-0.01*	0.00*
14	National Finance Co. Ltd. (NFCL)	-0.14*	0.03*	-0.02*	0.10*	0.07*	-0.05*	0.01*
15	Neco Insurance Co. Ltd. (NEIL)	-0.04	0.05	0.01	0.03	0.09	0.02	0.04
16	Nepal Bangladesh Bank Ltd. (NBBL)	0.08*	0.01*	-0.03*	-0.03*	-0.03*	0.05*	0.04*
17	Nepal Finance & Savings Co. Ltd.(NFSC)	0.00	0.02	0.05	0.01	-0.05	0.01	0.01
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	-0.14*	-0.02*	-0.02*	-0.02*	-0.05*	0.01*	0.10*
19	Nepal Insurance Co. Ltd. (NICL)	-0.15*	-0.07*	-0.01*	0.02*	-0.03*	0.04	0.05
20	Nepal Investment Bank Limited (NIBL)	0.02	0.03	-0.04	-0.06	0.01	0.02	-0.01
21	Nepal SBI Bank Limited (SBI)	0.03	0.02	-0.02	-0.04	-0.02	-0.02*	-0.01
22	NIDC Capital Market Limited (NCML)	-0.01	0.02	0.05	0.03	0.00	0.00	-0.02
23	People's Finance Limited (PFL)	-0.31*	0.02*	-0.01*	-0.03*	0.01*	0.03*	0.02*
24	Premier Insurance Co. Ltd. (PICL)	-0.14*	0.02*	-0.05*	-0.05*	0.05*	0.06*	0.02*
25	Soaltee Hotel Limited (SHL)	-0.17*	-0.02*	-0.06*	0.04*	-0.01*	0.00	0.02*
26	Standard Chartered Bank Limited (SCBL)	-0.44*	0.01*	0.00*	0.00*	0.01*	0.00*	0.00*

27	Taragaon Regency Hotel Ltd. (TRHL)	0.00	-0.06	0.04	-0.06	-0.03	0.02	-0.04
28	Uniliver Limited (ULL)	-0.03	0.10*	0.16*	0.01*	0.01*	-0.05*	-0.01*
29	United Insurance Co. Ltd. (UICL)	-0.13*	0.01*	0.03*	-0.01*	0.00*	0.01*	-0.04*
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	0.06	-0.01	0.05	-0.09	-0.05	0.08	0.11

* Significant at 5 percent

For lag 2, the highest positive autocorrelation coefficient has been observed for GRUL (0.14) followed by HGIC (0.13), ACEFIN (0.13), ULL (0.10), EICL (0.06), and BBC (0.06). On the other hand, highest negative autocorrelation coefficient has been observed for ANPF (-0.09) followed by NICL (-0.07), TRHL (-0.06), SHL (-0.02), NHDFC (-0.02) and UFCML (-0.01). The level of autocorrelation coefficient increased in the third lag. For lag 3, the highest coefficient has been observed for ULL (0.16) followed by EICL (0.08), ANPF (0.08), NFSC (0.05), NCML (0.05), and UFCML (0.05). As far as negative coefficients are concerned, the highest coefficient is observed for EBL (-0.08) followed by SHL (-0.06), NABIL (-0.06), BOK (-0.06), PICL (-0.05) and NIBL (-0.04).

The highest positive autocorrelation coefficient for lag 4 is observed for NFCL (0.10) followed by ACEFIN (0.09), EICL (0.07), HGIC (0.06), BBC (0.05), and KFL (0.04). The highest negative coefficient is observed for UFCML (-0.09) followed by NIBL (-0.06), TRHL (-0.06), PICL (-0.05), EBL (-0.04) and BOK (-0.04). Similarly, for lag 5, the highest positive coefficient is observed for HGIC (0.09) and NEIL (0.09) followed by NFCL (0.07), GRUL (0.07), CIT (0.05), and PICL (0.05). On the other hand, the highest negative coefficient is observed for ANPF (-0.08) followed EBL (-0.06), BOK (-0.06), HBL (-0.06), UFCML (-0.05) and NHDFC (-0.05).

As far as lag 12 is concerned, the highest positive autocorrelation coefficient is observed for GRUL (0.09) followed by UFCML (0.08), PICL (0.06) BBC (0.06), HBTF (0.05) and NBBL (0.05). The highest negative coefficient, on the other hand, is observed for HBL, ULL and NFCL (-0.05) followed by SBI (-0.02), NABIL and KFL (-0.01).

Table 3.13 provides further information on the frequency distribution of autocorrelation coefficient of daily return on individual companies. The table shows that *the first order autocorrelation coefficients of majority of companies lie within the range of –0.20 to 0.10. However, the autocorrelation coefficients of majority of companies lie within the range of minus 0.10 to plus 0.10.*

It has been observed that autocorrelation coefficient for 20 companies are significant up to lag 2. The number of significant coefficients up to lag 3 is, however, declined to 18; up to lag 4 it remained at 18 and up to lag 5 it further increased to 19. Similarly, there are 16 and 17 significant coefficients up to lag 12 and lag 30 respectively. This implies that the majority of the daily return shows stationarity pattern. This result further supports the earlier findings in daily market returns which indicate that Nepalese stock market does not follow random walk.

Table 3.13

Frequency distribution of autocorrelation of daily return on individual companies

Autocorrelation coefficient	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 4*	*Lag 5*	*Lag 12*	*Lag 30*
Less than -0.50	-	-	-	-	-	-	-
-0.50 - -0.40	*1*	-	-	-	-	-	-
-0.40 - -0.30	*1*	-	-	-	-	-	-
-0.30 - -0.20	*1*	-	-	-	-	-	-
-0.20 - -0.10	*8*	-	-	-	-	-	-
-0.10 – 0.00	*8*	*7*	*13*	*14*	*16*	*6*	*10*
0.00 – 0.10	*9*	*19*	*16*	*16*	*14*	*24*	*19*
0.10 – 0.20	*2*	*4*	*1*	-	-	-	*1*
0.20 – 0.30	-	-	-	-	-	-	
Above 0.30	-	-	-	-	-	-	
Total	*30*	*30*	*30*	*30*	*30*	*30*	*30*
No. of significant coefficients	*17*	*20*	*18*	*18*	*19*	*16*	*17*

The presence of negative serial correlation in lag 1 further indicates the reversal or correction property of the returns. On the other hand, if lag 30 is considered, momentum can be observed in returns series as majority (20 out of 30) coefficients are found to be positive. Negative signs in first order serial correlation are consistent with Wong and Kwong (1984) in Hong Kong stock market. However, this is in conflict with Fama (1965) on NYSE and Jennergren and Korsvold (1975) in Norwegian and Swedish stock market.

Agreements in signs among coefficients for different stock markets may indicate that there is a consistent pattern of dependence. However, King (1966) argued that price changes of different stocks are related to a certain extent to a 'market' component common to all stocks. This common market component may tend to common sign for ρ_K for all stocks during a specific sampling period. This reasoning together with small magnitudes of ρ_K led Fama (1965) to conclude that stock price changes on the NYSE were consistent with the weak form of the efficient market model.

Table 3.14

Randomness of daily return series for different lags

S. N	Company	P-value(<0.05) (NR)	P-value(>0.05) (R)	P-value = 0 (NR)
1	Ace Finance Company (ACEFIN)	1-14 lags	15-30 lags	
2	Annpurna Finance Company (ANPF)		1-30 lags	
3	Bishal Bazar Company (BBC)			1-30 lags
4	Bank of Kathmandu (BOK)			1-30 lags
5	Citizen Investment Trust (CIT)	1-6 lags, 15-30 lags	7-14 lags	
6	Everest Bank Limited (EBL)			1-30 lags
7	Everest Insurance Co. Ltd. (EICL)	1-21 lags	22-30 lags	
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	1-10, 12-15 lags	11, 16-30 lags	
9	Harisidhhi Brick & Tile Factory (HBTF)	1, 17-30 lags	2-16 lags	
10	Himalayan Bank Limited (HBL)		1-30 lags	

11	Himalayan General Ins. Ltd. (HGIC)	2-10, 19-30 lags	11-18 lags	
12	Kathmandu Finance Limited (KFL)	1, 2, 17, 20-30 lags	3-16, 18, 19 lags	
13	Nabil Bank Limited (NABIL)	1-30 lags		
14	National Finance Co. Ltd. (NFCL)	1-30 lags		
15	Neco Insurance Co. Ltd. (NEIL)	1, 2, 5-11 lags	3, 4, 12-30 lags	
16	Nepal Bangladesh Bank Ltd. (NBBL)	1-30 lags		
17	Nepal Finance & Savings Co. Ltd.(NFSC)		1-30 lags	
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	1-30 lags		
19	Nepal Insurance Co. Ltd. (NICL)	1-7, 11 lags	8-10, 12-30 lags	
20	Nepal Investment Bank Limited (NIBL)		1-30 lags	
21	Nepal SBI Bank Limited (SBI)	8-17 lags	1-7, 18-30 lags	
22	NIDC Capital Market Limited (NCML)		1-30 lags	
23	People's Finance Limited (PFL)			1-30 lags
24	Premier Insurance Co. Ltd. (PICL)			1-30 lags
25	Soaltee Hotel Limited (SHL)	1-11,13-24, 26, 29-30 lags	12, 25, 27-28 lags	
26	Standard Chartered Bank Limited (SCBL)			1-30 lags
27	Taragaon Regency Hotel Ltd. (TRHL)		1-30 lags	
28	Uniliver Limited (ULL)	2-30 lags	1 lag	
29	United Insurance Co. Ltd. (UICL)	1-12 lags	13-30 lags	
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)		1-30 lags	

There is now rather significant evidence that if percentage changes in stock prices are measured over long intervals, successive percentage changes in stock prices are highly negatively correlated. Fama and French (1988) shows 5-year returns pronounced negative correlation when serial correlation coefficients for 10 equally weighted common stock portfolios, classified on the basis of size for overlapping periods in 1926 through 1985 were computed.

An interesting feature of these results are that the observed first order coefficients are found to be relatively larger and statistically significant for some shares which are regarded as most actively traded in Nepal Stock Exchanges such as SCBL, NABIL, BOK, *NBBL and EBL. Moreover, the autocorrelation coefficients for all these shares are negative. This provides further evidence against the random walk model in Nepalese stock market.*

Table 3.15 exhibits the autocorrelation coefficients of weekly return series of individual companies for lag 1-5, 12 and 30. The first order autocorrelation of 18 companies (60 percent) found insignificant indicating that majority of the companies' returns is not serially dependent. The number of companies having insignificant coefficient increased to 20 (67 percent) if lag 30 is taken into account. Regarding the sign of the autocorrelation coefficients, 18 companies (60 percent) exhibited negative signs in first order coefficients, whereas 20 companies (67 percent) showed positive autocorrelation coefficient for lag 30. The highest coefficient found in weekly returns was –0.28 for PFL in lag one.

The highest positive autocorrelation on weekly return for lag one is observed for GRUL (0.14) and HGIC (0.14) followed by NEIL (0.13), NFSC (0.12), ULL (0.12), and UFCML (0.12). The highest negative coefficient, however, is observed for PFL (-0.28) followed by SHL (-0.19), NABIL (-0.16), EBL (-0.16), TRHL (-0.14) and NHDFC (0.14). For Lag 2, the highest positive coefficient is observed for NFCL (0.21) followed by GRUL (0.14), HGIC (0.13), ACEFIN (0.13), NCML (0.10), and CIT (0.09). The highest negative coefficient, on the other hand, is observed for HBTF (-0.15) followed by ANPF (-0.13), UFCML (-0.13), SBI (-0.12), EBL (-0.09) and BOK (-0.09).

Table 3.15

Autocorrelation function test: weekly return on individual companies

This table presents autocorrelation coefficient of weekly return on individual companies. The return is computed by taking logarithms of closing prices considering dividend yields, i.e. $r_{it} = LN\left(\frac{P_t + D_t}{P_{t-1}}\right)$. The autocorrelation function is a test of stationarity that tests statistical significance of any individual autocorrelation coefficient at certain lag is zero. A zero autocorrelation means the returns in given series are not dependent upon the past return (or lagged values). This confirms the series is non-stationary and thus random. In this table, the joint hypothesis that all the autocorrelation coefficients up to certain lags are simultaneously equal to zero is tested by using Ljung-Box Q-statistic, which is defined as $LB = n(n+2)n\sum_{k=1}^{m}\frac{\rho_k^2}{n-k}$. Any p-value greater than 0.5 accepts the null hypothesis of randomness (ρ = 0) and p-value less than 0.05 rejects the null hypothesis implying that the series is stationary. Any autocorrelation coefficient with * indicates the significant value indicating that the series is stationary (non-random) up to that lag.

S. N	Company	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 12	Lag 30
1	Ace Finance Company (ACEFIN)	-0.05	0.13	0.12	-0.02	0.02	0.12	-0.07*
2	Annpurna Finance Company (ANPF)	0.00	-0.13	-0.02	0.02	0.24	-0.03	0.06
3	Bishal Bazar Company (BBC)	-0.10*	-0.09*	0.11*	0.07*	0.05*	0.04*	0.02*
4	Bank of Kathmandu (BOK)	-0.03	-0.03	0.03	0.07	-0.03	0.08	-0.07
5	Citizen Investment Trust (CIT)	-0.12	0.09*	-0.03	0.07	0.10	-0.01	-0.02
6	Everest Bank Limited (EBL)	-0.16*	-0.09*	0.04*	0.03*	0.00*	-0.02*	0.09*
7	Everest Insurance Co. Ltd. (EICL)	0.05	0.00	0.07	0.05	0.05	0.01	0.03
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	0.14*	0.14*	0.02*	-0.02	0.00	-0.03	0.04
9	Harisidhhi Brick & Tile Factory (HBTF)	0.08	-0.15*	-0.18*	-0.07*	0.06*	0.12*	0.06
10	Himalayan Bank Limited (HBL)	-0.09*	-0.02	-0.01	0.02	-0.01	-0.08	0.00
11	Himalayan General Ins. Ltd. (HGIC)	0.14*	0.13*	0.14*	0.01*	0.01*	0.12*	-0.04
12	Kathmandu Finance Limited (KFL)	-0.09	0.00	-0.11	-0.01	-0.02	0.03	0.01
13	Nabil Bank Limited (NABIL)	-0.16*	0.08*	0.01*	0.02*	0.01*	0.02*	-0.01
14	National Finance Co. Ltd. (NFCL)	-0.14*	0.21*	-0.06*	0.06*	-0.06*	0.18*	0.03*
15	Neco Insurance Co. Ltd. (NEIL)	0.13	-0.02	-0.09	0.09	0.09	0.05	-0.03
16	Nepal Bangladesh Bank Ltd. (NBBL)	-0.07	0.02	0.01	0.05	0.10	0.08*	-0.02
17	Nepal Finance & Savings Co. Ltd.(NFSC)	0.12	-0.02	-0.03	0.09	0.06	0.06	0.06*
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	-0.14*	0.03*	0.03	0.01	0.05	-0.02	-0.02
19	Nepal Insurance Co. Ltd. (NICL)	-0.13	0.06	-0.05	0.00	-0.07	-0.05	0.03
20	Nepal Investment Bank Limited (NIBL)	-0.09	-0.03	-0.01	0.03	0.00	0.05	0.09
21	Nepal SBI Bank Limited (SBI)	-0.03	-0.12*	0.03	0.00	-0.01	-0.04	0.02
22	NIDC Capital Market Limited (NCML)	0.06	0.10	0.04	0.09	0.11	0.06*	0.08*
23	People's Finance Limited (PFL)	-0.28*	-0.07*	0.06*	0.08*	-0.12*	-0.07*	0.06*
24	Premier Insurance Co. Ltd. (PICL)	-0.06	-0.05	-0.08	0.04	0.12	-0.03*	0.01*
25	Soaltee Hotel Limited (SHL)	-0.19*	-0.06*	0.06*	-0.01	0.04	0.05	-0.02

26	Standard Chartered Bank Limited (SCBL)	0.01	-0.03	0.05	0.00	-0.03	-0.06	0.03
27	Taragaon Regency Hotel Ltd. (TRHL)	-0.14*	0.02	-0.05	-0.03	-0.03	0.01	0.08*
28	Uniliver Limited (ULL)	0.12*	0.05	0.03	0.02	-0.07	0.11*	0.07*
29	United Insurance Co. Ltd. (UICL)	0.00	-0.08	-0.04	0.06	-0.08	-0.01	0.07
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	0.12	-0.13*	-0.12*	0.09*	0.05*	0.06	-0.02

* Significant at 5 percent

For lag 3, the highest autocorrelation coefficient is observed for HGIC (0.14) followed by ACEFIN (0.12), BOK (0.11), EICL (0.07), SHL (0.06), and PFL (0.06). Similarly, the highest negative coefficient is observed for HBTF (-0.18) followed by UFCML (-0.12), KFL (-0.11), NEIL (-0.09), PICL (-0.08) and NFCL (-0.06). Interestingly, the highest positive coefficient for lag 4 is observed for four companies NCML, NFSL, NEIL and UFCML (0.09) followed by PFL (0.08) and BOK (0.07). Likewise, the highest negative coefficient is observed for HBTF (-0.07) followed by TRHL (-0.03), GRUL (-0.02), ACEFIN (-0.02), KFL (-0.01) and SHL (-0.01).

As far as lag 5 is concerned, the highest positive coefficient is observed for ANPF (0.24) followed by PICL (0.12), NCML (0.11), CIT (0.10), NBBL (0.10), and NEIL (0.09). On the other hand, the highest negative coefficient is observed for PFL (-0.12) followed by UICL (-0.08), NICL (-0.07), ULL (-0.07), NFCL (-0.06) and TRHL (-0.03). For lag 12, the highest coefficient is observed for NCML (0.18) followed by HBTF, ACEFIN and HGIC (0.12), ULL (0.11) and NBBL (0.08). The highest negative coefficient is observed for HBL (-0.08) followed by PFL (-0.07), SCBL (-0.06), NICL (-0.05), SBI (-0.04) and GRUL (-0.03).

For lag 30, the highest autocorrelation coefficient has been observed for EBL and NIBL (0.09) followed by NCML and TRHL (0.08) and ULL and UICL (0.07). The highest negative coefficient, on the other hand, is observed for BBC and ACEFIN (-0.07) followed by HGIC (-0.04), NEIL (-0.03), UFCML and SHL (-0.02).

Table 3.16 further reports the frequency distribution of autocorrelation of weekly return on individual companies. The table shows that autocorrelation coefficient is centered on -0.10 to + 0.10 for most of the lags. Within this interval, 15 (50 percent) *coefficients are observed for lag one. For lag 2, the proportion of coefficient further increased to 21 (70 percent) and this number is increased to 24 (80 percent) for lag 3 and lag 5 within this interval. Interestingly, for lag 4, and lag 30 almost all (100 percent) coefficients lie within this interval. However, 25 (83 percent) coefficients are observed for lag 12 lie within this interval. It is further observed that number of significant coefficients lies within the range of 8 to 13. This shows that for lags 1-5, 12 and 30, less than 50 percent coefficients are significantly different from zero indicating that there is some component of randomness in weekly return series.*

Table 3.16

Frequency distribution of autocorrelation of weekly return on individual companies

Autocorrelation coefficient	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 4*	*Lag 5*	*Lag 12*	*Lag 30*
Less than -0.30	-	-	-	-	-	-	-
-0.30 - -0.20	*1*	-	-	-	-	-	-
-0.20 - -0.10	*8*	*4*	*3*	-	*1*	-	-
-0.10 – 0.00	*9*	*12*	*11*	*6*	*10*	*12*	*10*
0.00 – 0.10	*6*	*9*	*13*	*24*	*14*	*13*	*20*
0.10 – 0.20	*6*	*4*	*3*	-	*4*	*5*	-
0.20 – 0.30	-	*1*	-	-	*1*	-	-
Above 0.30	-	-	-	-	-	-	-
Total	*30*	*30*	*30*	*30*	*30*	*30*	*30*
No.of significant coefficients	*12*	*13*	*10*	*8*	*8*	*11*	*10*

The results of weekly return series are not consistent with Conarad and Kaul (1988) and Lo and MacKinlay (1988). Both of these studies examine weekly returns of NYSE stock and found positive serial correlation over short horizons. However, the correlation coefficient of weekly returns tends to be fairly small, at least for large stocks for which price data most reliably up to date.

However, the results of this study are consistent with Dickinson and Muragu (1994). The study showed vast majority of coefficients is not statistically significant and does not reject the hypothesis of independence using weekly return returns series.

Table 3.18 provides the autocorrelation coefficients of monthly returns of individual companies for lag 1-5, 12 and 30. The first order autocorrelation for majority of the companies are found insignificant. The coefficients of three companies (10 percent) are *significantly different from zero. The numbers of positive first order coefficients are 18 (60 percent). The highest positive autocorrelation coefficient is observed for NBBL (0.24) followed by BOK (0.20), EICL (0.14), NHDFC, NCML and ULL (0.13). The magnitude of highest autocorrelation coefficient in first lag is increased to –0.31 for HBTF followed by PFL (-0.25), UFCML (-0.14), PICL (-0.10), SHL (-0.09) and KFL (-0.07).*

Table 3.17

Randomness of weekly return series for different lags

SN	Company	P-value (<0.05) (NR)	P-value (>0.05) (R)
1	Ace Finance Company (ACEFIN)	24, 26-30 lags	1-23, 25 lags
2	Annpurna Finance Company (ANPF)		1-30 lags
3	Bishal Bazar Company (BBC)		1-30 lags
4	Bank of Kathmandu (BOK)	1-30 lags	
5	Citizen Investment Trust (CIT)	1-2, 6-10 lags	3-5, 11-30 lags
6	Everest Bank Limited (EBL)	1-15, 27-30 lags	16-26 lags
7	Everest Insurance Co. Ltd. (EICL)		1-30 lags
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	1-3, 7-9 lags	4-6, 10-30 lags
9	Harisidhhi Brick & Tile Factory (HBTF)	2-8, 11-21, 25 lags	1, 9-10, 22-24, 26-30 lags
10	Himalayan Bank Limited (HBL)	1 lags	2-30 lags
11	Himalayan General Ins. Ltd. (HGIC)	1-8, 12-15 lags	9-11, 16-30 lags
12	Kathmandu Finance Limited (KFL)		1-36 lags
13	Nabil Bank Limited (NABIL)	1-16, 18 lags	17, 19-30 lags
14	National Finance Co. Ltd. (NFCL)	1-36 lags	
15	Neco Insurance Co. Ltd. (NEIL)	2 lag	1, 3-30 lags
16	Nepal Bangladesh Bank Ltd. (NBBL)	7-17 lags	1-6, 18-30 lags
17	Nepal Finance & Savings Co. Ltd.(NFSC)	22-24, 26-30 lags	1-21, 25 lags
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	1-2 lags	3-30 lags
19	Nepal Insurance Co. Ltd. (NICL)	1 lags	2-30 lags
20	Nepal Investment Bank Limited (NIBL)		1-30 lags
21	Nepal SBI Bank Limited (SBI)	2 lag	1, 3-30 lags
22	NIDC Capital Market Limited (NCML)	7-30 lags	1-6 lags
23	People's Finance Limited (PFL)	1-30 lags	
24	Premier Insurance Co. Ltd. (PICL)	6-30 lags	1-5 lags
25	Soaltee Hotel Limited (SHL)	1-3 lags	4-30 lags
26	Standard Chartered Bank Limited (SCBL)		1-30 lags
27	Taragaon Regency Hotel Ltd. (TRHL)	1, 26-34 lags	2-25 lags
28	Uniliver Limited (ULL)	1, 8-30 lags	2-7 lags
29	United Insurance Co. Ltd. (UICL)		1-30 lags
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	2-5 lags	1, 6-30 lags

There are 16 (53 percent) positive and 14 (47 percent) negative coefficients in lag two. The highest positive coefficients observed for NCML (0.23) followed by BOK (0.19), NBBL (0.15), NFSC (0.14), ULL and NFCL (0.11). The highest negative coefficient, on the other hand, is observed for ANPF (-0.27) followed by NHDFC (-0.16), PICL and KFL (-0.09), and HBL (-0.08). Similarly, for lag 3, the highest positive coefficient is observed for BOK (0.26) followed by SBI (0.22), ACEFIN (0.20), HGIC (0.18), NCML and KFL (0.17). The highest negative coefficient is observed for NICL (-0.17) followed by HBL (-0.14), ANPF, PICL and CIT (-0.08) and SCBL (-0.07). The number of positive coefficients observed in this lag is 17 (57 percent).

Table 3.18

Autocorrelation function test: monthly return on individual companies

This table presents autocorrelation coefficient of monthly return on individual companies. The return is computed by taking logarithms of closing prices considering dividend yields, i.e. $r_{it} = LN\left(\frac{P_t + D_t}{P_{t-1}}\right)$. *The autocorrelation function is a test of stationary that tests statistical significance of any individual autocorrelation coefficient at certain lag is zero. A zero autocorrelation means the returns in given series are not dependent upon the past return (or lagged values). This confirms the series is non-stationary and thus random. In this table, the joint hypothesis that all the autocorrelation coefficients up to certain lags are simultaneously equal to zero is tested by using Ljung-Box Q-statistic, which is defined as* $LB = n(n+2)n\sum_{k=1}^{m}\frac{\rho_k^2}{n-k}$. *Any p-value greater than 0.5 accepts the null hypothesis of randomness (ρ = 0) and p-value less than 0.05 rejects the null hypothesis implying that the series is stationary. Any autocorrelation coefficient with * indicates the significant value indicating that the series is stationary (non-random) up to that lag.*

S. N.	Company	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5	Lag 12	Lag 30
1	Ace Finance Company (ACEFIN)	0.00	0.09	0.20	0.11	0.11	-0.07	-0.07
2	Annpurna Finance Company (ANPF)	0.09	-0.27*	-0.08*	0.11*	0.01*	0.09	-0.07
3	Bishal Bazar Company (BBC)	0.20	0.19*	0.26*	-0.02*	0.33*	-0.20*	-0.18*
4	Bank of Kathmandu (BOK)	0.03	0.07	-0.04	0.05	-0.09	0.03	-0.03
5	Citizen Investment Trust (CIT)	0.04	0.05	-0.08	0.02	0.14	0.01	-0.07
6	Everest Bank Limited (EBL)	-0.04	-0.03	-0.01	0.11	0.02	-0.13	-0.05
7	Everest Insurance Co. Ltd. (EICL)	0.14	0.00	-0.02	-0.07	0.04	0.15	-0.04
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	0.03	-0.04	0.15	0.02	-0.01	0.05	0.08
9	Harisidhhi Brick & Tile Factory (HBTF)	-0.31*	-0.01*	-0.01*	0.01*	-0.01*	-0.09	0.01*
10	Himalayan Bank Limited (HBL)	-0.01	-0.08	-0.14	0.05	0.01	0.05	-0.06
11	Himalayan General Ins. Ltd. (HGIC)	0.04	0.09	0.18	0.14	0.05	0.03	-0.13
12	Kathmandu Finance Limited (KFL)	-0.07	-0.09	0.17	0.08	0.02	0.07	-0.10
13	Nabil Bank Limited (NABIL)	0.01	-0.05	0.02	0.02	0.06	-0.08	-0.08
14	National Finance Co. Ltd. (NFCL)	0.04	0.11	-0.01	0.10	0.07	0.17	-0.09
15	Neco Insurance Co. Ltd. (NEIL)	-0.02	0.03	0.13	0.08	-0.05	0.23	0.01
16	Nepal Bangladesh Bank Ltd. (NBBL)	0.24*	0.15*	0.11*	0.10*	0.15*	0.10*	-0.01
17	Nepal Finance & Savings Co. Ltd.(NFSC)	0.01	0.14	0.09	0.13	0.05	-0.06	-0.04
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	0.13	-0.16	0.03	0.19	0.02	0.01	-0.09*
19	Nepal Insurance Co. Ltd. (NICL)	-0.03	-0.01	-0.17	0.09	0.01	0.00	0.04
20	Nepal Investment Bank Limited (NIBL)	-0.06	0.06	0.05	-0.01	0.07	-0.06	-0.04
21	Nepal SBI Bank Limited (SBI)	0.01	-0.05	0.22	-0.03	-0.04	0.22*	0.02*
22	NIDC Capital Market Limited (NCML)	0.13	0.23*	0.17*	0.10*	0.19*	-0.07*	-0.07*

23	People's Finance Limited (PFL)	-0.25*	-0.03*	0.04*	-0.02	0.00	-0.04	0.07
24	Premier Insurance Co. Ltd. (PICL)	-0.10	-0.09	-0.08	0.14	0.19	0.16*	-0.01*
25	Soaltee Hotel Limited (SHL)	-0.09	-0.03	0.09	0.03	0.01	0.05	-0.10
26	Standard Chartered Bank Limited (SCBL)	-0.01	-0.01	-0.07	-0.08	-0.06	-0.09	-0.04
27	Taragaon Regency Hotel Ltd. (TRHL)	0.01	0.03	-0.01	-0.13	0.03	-0.16	-0.02
28	Uniliver Limited (ULL)	0.13	0.11	0.12	0.10	0.09	0.02	-0.06
29	United Insurance Co. Ltd. (UICL)	0.04	0.02	0.02	0.04	0.11	-0.03	-0.06
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	-0.14	0.04	-0.06	0.03	0.07	0.08	-0.21

* Significant at 5 percent

As far as lag 4 is concerned, the number of positive coefficients is increased to 23 (77 percent). The highest positive coefficient is observed for NHDFC (0.19) followed by HGIC and PICL (0.14), NFSC (0.13), ACEFIN and EBL (0.11). Contrarily, the highest negative coefficient is observed for TRHL (-0.13), SCBL (-0.08), EICL (-0.07), SBI (-0.03), PFL and BOK (-0.02). For lag 5, the number of positive coefficients further increased to 25 (83 percent). The highest positive coefficient is observed for BOK (0.33) followed by PICL and NCML (0.19), NBBL (0.15), CIT (0.14) and ACEFIN (0.11). The highest negative coefficient is observed for BBC (-0.09), followed by SCBL (-0.06), NEIL (-0.05), SBI (-0.04), HBTF and GRUL (-0.01).

However, number of positive coefficients for lag 12 is reduced to 19 (63 percent) and it further reduced to 6 (20 percent) for lag 30.The highest positive coefficient for lag 12 is observed for NEIL (0.23) followed by SBI (0.22), NFCL (0.17), PICL (0.16), EICL (0.15) and NBBL (0.10). On the other hand, the highest negative coefficient is observed for BOK (-0.20) followed by TRHL (-0.16), EBL (-0.13), SCBL and HBTF (-0.09) and NABIL (-0.08). For lag 30, the highest positive coefficient is observed for GRUL (0.08) followed by PFL (0.07), NICL (0.04), SBI (0.02), NEIL and HBTF (0.01).

Table 3.19 further provides frequency distribution of autocorrelation coefficient of monthly return on individual companies. Likewise in weekly returns, the table shows that majority of coefficients for lag 1-5, 12 and 30 lie within the interval of –0.10 to +0.10. For lag one, 21 coefficients (70 percent) lie within this interval, whereas in lag 2 the number marginally decreased to 20 (67 percent). The numbers of coefficients lie within this interval up to lag 3, lag 4, lag 5, lag 12 and lag 30 are 16 (54 percent), 18 (60 percent), 23 (77 percent), 21 (70 percent) and 27 (90 percent). However, number of significant coefficients decreased to minimum of three and maximum of six. This implies that the monthly returns of most of the company are randomly distributed. In other words, the result of return on individual companies indicates that there is no serial dependence in monthly returns of individual companies.

Table 3.19

Frequency distribution of autocorrelation of monthly return on individual companies

Autocorrelation coefficient	*Lag 1*	*Lag 2*	*Lag 3*	*Lag 4*	*Lag 5*	*Lag 12*	*Lag 30*
Less than -0.50	-	-	-	-	-	-	-
-0.50 - -0.40	-	-	-	-	-	-	-
-0.40 - -0.30	*1*	-	-	-	-	-	-
-0.30 - -0.20	*1*	*1*	-	-	-		*1*
-0.20 - -0.10	*1*	*1*	*1*	*1*	-	*3*	*2*
-0.10 – 0.00	*9*	*12*	*6*	*6*	*6*	*9*	*21*
0.00 – 0.10	*12*	*10*	*10*	*12*	*17*	*12*	*6*
0.10 – 0.20	*4*	*5*	*6*	*11*	*6*	*4*	-
0.20 – 0.30	*2*	*1*	*7*	-	*1*	*2*	-
Above 0.30	-	-	-	-	-	-	-
Total	*30*	*30*	*30*	*30*	*30*	*30*	*30*
No. of significant coefficients	*3*	*6*	*6*	*5*	*5*	*5*	*6*

Table 3.20 provides the summary results of the randomness of the monthly return series of individual companies for different lags. As exhibited in the table, majority of the companies' returns are independent at lag one and lag thirty. The table further provides evidences as regards to the movement of stock prices of majority of large companies are also random up to lag thirty. However, the results observed for monthly series are not consistent with weekly and daily series.

The results of monthly return series are not consistent with Cooper (1982). The study examined first order serial correlation coefficients of 36 different stock markets around the globe using monthly, weekly and daily returns. The study revealed that first order serial correlation of monthly data is small in magnitude with the largest value being 0.40 for Eire. The study exhibited all stock markets, except Japan, some serial correlation up to lag 25 which is significantly different from zero, so indicating some degree of dependence.

On the other hand, the results of the study are in consistent with Barnes (1986). The study also utilized monthly return of 30 companies listed in Kuala Lumpur Stock Exchange (KLSE). Out of 30 companies, only two companies exhibited strong departure from WEMH, using serial correlation coefficient. The magnitude of coefficient is between +0.38 and –0.38.

Table 3.20

Randomness of monthly return series for different lags

SN	Company	P-value (<0.05) (NR)	P-value (>0.05) (R)	P-value = 0 (NR)
1	Ace Finance Company (ACEFIN)	13-14 lags	1-12, 15-30 lags	
2	Annpurna Finance Company (ANPF)	2-8, 10, 13-14 lags	1, 9, 11-12, 15-30 lags	
3	Bishal Bazar Company (BBC)		1-30 lags	
4	Bank of Kathmandu (BOK)	1-4 lags		5-30 lags
5	Citizen Investment Trust (CIT)		1-30 lags	
6	Everest Bank Limited (EBL)		1-30 lags	
7	Everest Insurance Co. Ltd. (EICL)		1-30 lags	
8	Gorakhkali Rubber Udyog Ltd.(GRUL)		1-30 lags	
9	Harisidhhi Brick & Tile Factory (HBTF)	1-5, 8-10, 13-30 lags	6-7, 11-12 lags	
10	Himalayan Bank Limited (HBL)		1-30 lags	
11	Himalayan General Ins. Ltd. (HGIC)		1-30 lags	
12	Kathmandu Finance Limited (KFL)	7-11, 13-27 lags	1-6,12, 28-30 lags	
13	Nabil Bank Limited (NABIL)		1-30 lags	
14	National Finance Co. Ltd. (NFCL)		1-30 lags	
15	Neco Insurance Co. Ltd. (NEIL)		1-30 lags	
16	Nepal Bangladesh Bank Ltd. (NBBL)	1-17 lags	18-30 lags	
17	Nepal Finance & Savings Co. Ltd.(NFSC)	9,14 lags	1-8, 10-13, 15-30 lags	
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	28-30 lags	1-27 lags	
19	Nepal Insurance Co. Ltd. (NICL)		1-30 lags	
20	Nepal Investment Bank Limited (NIBL)		1-30 lags	
21	Nepal SBI Bank Limited (SBI)	11-30 lags	1-10 lags	
22	NIDC Capital Market Limited (NCML)	2-30 lags	1 lags	

23	People's Finance Limited (PFL)	1-3 lags	4-30 lags
24	Premier Insurance Co. Ltd. (PICL)	8-30 lags	1-7 lags
25	Soaltee Hotel Limited (SHL)		1-30 lags
26	Standard Chartered Bank Limited (SCBL)		1-30 lags
27	Taragaon Regency Hotel Ltd. (TRHL)		1-30 lags
28	Uniliver Limited (ULL)	11,15 lags	1-10, 12-14, 16-30 lags
29	United Insurance Co. Ltd. (UICL)		1-30 lags
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)		1-30 lags

In sum, the statistical analysis of individual price series reveals that share price behavior in Nepal cannot be approximated well by the random walk model using daily returns. However, if weekly and monthly returns are considered majority of the companies shows independence of returns. The results of the individual shares are, thus, consistent with first order serial correlation with market return. The series of daily price change display dependence of significant order from a statistical point of view. Hence, the evidence produced by these results indicates that the Nepal Stock Exchange is not 'weak-form' efficient in pricing shares.

3.4.4 Runs test

An alternative test, based on runs, has been conducted to provide evidence on the randomness of the price series. Its application is appealing in that, unlike the serial correlation test, it is not affected by any extreme values in the return series. The hypothesis in this test is that the successive price returns on market and selected enterprises were random. It has been tested by examining the relationship between the number of runs observed in the series and the expected number of runs. The number of runs was computed as a sequence of the price changes of the same sign. The computed value (labeled Z-value in table) is significant at five percent level if it lies beyond its critical value of ± 1.96. Table 3.21 provides the result of runs test of market return.

Table 3.21

Runs test: market return

This table lists statistics associated with the runs test of daily, weekly and monthly return. Runs test, being a non-parametric test, is a procedure that examines consecutive occurrence of a variable. This variable has only two categories. The runs test classifies values of the variable as being above or below the mean (test value). The test employs the total number of runs in the transformed data. Large significance values (p-value > 0.05) indicate the data are randomly ordered. In the table 'N_1' stands for the cases below mean, 'N_2' stands for the cases above or equal to mean, 'N' for total number of cases, E(R) for expected number of runs and 'R' for observed number of runs. Any Z-value with * indicates the significant difference between actual number of runs and observed number of run indicating that the series is not random.

Return series	**N_1**	**N_2**	**N**	**E(R)**	**R**	**Z-value**
Daily	1180	1164	2344	1173	904	-11.11*
Weekly	230	278	508	253	213	-3.56*
Monthly	59	61	120	61	54	-1.28

* Significant at 5 percent

The table exhibits that out of the 2344 total cases in daily market returns 1180 cases are below the mean whereas 1164 cases are above or equal to the mean value of 0.02 percent. The expected number of runs for this return series is 1173 and actual number of runs is 904. The Z-statistic is negative because of the fewer actual runs than expected number of runs. Further, the $|Z|$-value indicates that actual runs and expected runs are significantly different. For a random series, it is expected that the actual number of runs are not significantly different from expected number of runs. The significant z-value, thus, suggests the dependence in the return and does not support the hypothesis of randomness in the returns on Nepalese stock market.

Similarly, there are 508 cases in weekly market return, of which 230 cases are below the mean and 278 cases are above or equal to mean value of 0.13 percent. The expected number of runs is 253 and actual number of runs is 213. Likewise, in daily market return, the $|Z|$-value is negative and significant indicating that weekly market returns are dependent in their previous returns. Thus, the result does not support the random walk hypothesis.

In contrast, out of 120 total cases 59 cases are below the mean and 61 cases are equal to or above the mean. The expected number of runs is 61 and actual number of runs is 54. Though the $|Z|$-value is negative due to fewer numbers of actual runs than expected runs, it is not significant. This suggests that monthly market returns are randomly distributed. In other words, future prices cannot be predicted on the basis of historical prices.

Table 3.22 provides the results of runs test of daily return of individual enterprises. Out of 30 enterprises, the actual number of runs and expected number of runs for 17 (57 percent) enterprises are not significantly different. This indicates daily return on majority of companies move randomly. The highest $|Z|$-value is observed for SCBL (11.22) followed by NBBL (9.49), NIBL (8.52), NABIL (8.03), HBL (7.06), and EBL (6.90). All these values are negative and significant. Interestingly, the highest expected number of runs is observed for NBBL (1010.7) followed by NABIL (975.5), EBL (924.8), SCBL (912.4), SBI (892), and HBL (858.2). On the other hand, the highest actual number of runs is observed for NABIL (801) followed by NBBL (800), SBI (792), HBL (714), EBL (701), and SCBL (678).

Table 3.23 exhibits the results of runs test of weekly return on individual companies. Out of 30 companies, the actual number of runs for 10 (34 percent) is significantly different from expected number of runs. On the other hand, the actual number of runs does not differ significantly for 20 companies (67 percent) from expected number of runs. Thus, majority of the weekly returns on enterprises show no serial dependence on their past values. The highest expected number of runs is observed for NABIL (252.6) followed by HBL (247), SBI (241.2), NBBL (241), SCBL (237.7), and EBL (233.9). Similarly, the highest actual number of runs is observed for HBL (236) followed by NABIL (228), NBBL (220), EBL (211), SBI (209), and BOK (206).

Table 3.22

Runs test: daily return on individual companies

This table lists statistics associated with the runs test of daily return on listed companies. Runs test, being a non-parametric test, is a procedure that examines consecutive occurrence of a variable. This variable has only two categories. The runs test classifies values of the variable as being above or below the mean (test value). The test employs the total number of runs in the transformed data. Large significance values (p-value>0.05) indicate the data are randomly ordered. In the table 'N_1' stands for the cases below mean, 'N_2' stands for the cases above or equal to mean, 'N' for total number of cases, E(R) for expected number of runs and 'R' for observed number of runs. Any Z-value with * indicates the significant difference between actual number of runs and observed number of runs indicating that the series is not random.

S.N.	Company	N_1	N_2	N	E(R)	R	Z-value	R/NR
1	Ace Finance Company (ACEFIN)	154	320	474	208.9	167	-4.40*	NR
2	Annpurna Finance Company (ANPF)	134	241	375	173.2	149	-2.73*	NR
3	Bishal Bazar Company (BBC)	115	216	331	151.1	151	-0.01	R
4	Bank of Kathmandu (BOK)	559	784	1343	653.7	552	-5.71*	NR
5	Citizen Investment Trust (CIT)	175	464	639	255.1	271	1.58	R
6	Everest Bank Limited (EBL)	800	1093	1893	924.8	701	-6.90*	NR
7	Everest Insurance Co. Ltd. (EICL)	307	706	1013	428.9	331	-1.23	R
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	381	136	517	201.4	194	-0.85	R
9	Harisidhhi Brick & Tile Factory (HBTF)	437	156	593	230.9	231	0.01	R
10	Himalayan Bank Limited (HBL)	733	1032	1765	858.2	714	-7.07*	NR
11	Himalayan General Ins. Ltd. (HGIC)	122	309	431	175.9	167	-1.06	R
12	Kathmandu Finance Limited (KFL)	252	549	801	346.4	344	-0.2	R
13	Nabil Bank Limited (NABIL)	831	1178	2009	975.5	801	-8.03*	NR
14	National Finance Co. Ltd. (NFCL)	148	293	441	197.7	185	-1.35	R
15	Neco Insurance Co. Ltd. (NEIL)	121	317	438	176.1	162	-1.69	R
16	Nepal Bangladesh Bank Ltd. (NBBL)	878	1188	2066	1010.7	800	-9.49*	NR
17	Nepal Finance & Savings Co. Ltd.(NFSC)	167	289	456	212.7	201	-1.18	R
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	221	537	758	314.1	343	2.54*	NR
19	Nepal Insurance Co. Ltd. (NICL)	353	137	490	198.4	199	0.07	R
20	Nepal Investment Bank Limited (NIBL)	595	895	1490	715.8	558	-8.52*	NR
21	Nepal SBI Bank Limited (SBI)	1362	662	2024	892.0	792	-5.05*	NR
22	NIDC Capital Market Limited (NCML)	461	190	651	270.1	265	-0.48	R
23	People's Finance Limited (PFL)	234	590	824	336.1	306	-2.58*	NR
24	Premier Insurance Co. Ltd. (PICL)	258	695	953	377.3	368	-0.76	R
25	Soaltee Hotel Limited (SHL)	345	142	487	202.2	205	0.31	R
26	Standard Chartered Bank Limited (SCBL)	757	1145	1902	912.4	678	-11.22*	NR
27	Taragaon Regency Hotel Ltd. (TRHL)	437	166	603	241.6	238	-0.37	R
28	Uniliver Limited (ULL)	245	468	713	322.6	273	-4.12*	NR
29	United Insurance Co. Ltd. (UICL)	269	628	897	377.7	383	0.42	R
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	126	324	450	182.4	170	-1.46	R

* Significant at 5 percent

The table further reports that actual numbers of runs of 23 (77 percent) enterprises are fewer than expected number of runs. The highest difference in actual and expected number of runs is observed for SCBL followed by SBI, NIBL, HGIC, PICL and UICL. The z-values of these companies are negative and significant. Surprisingly, one enterprise, SHL, has equal number of actual and expected runs. In a random walk test, the returns are assumed to be randomly distributed if there is no difference between actual and expected number of runs.

Table 3.24 provides results of runs test of monthly return on individual companies. The table shows that actual number runs of five enterprises (17 percent) are significantly different from expected number of runs. This implies that majority of returns on enterprises are randomly distributed. The highest expected number of runs has been observed for SBI (61) followed by NABIL, SCBL and ULL (each 60.2) and NIBL (59.9). The highest actual number of runs, on the other hand, has been observed for NABIL (68) followed by SCBL (62), SHL (60), NHDFC (59), SBI (58), and ULL (57). It is further observed that actual numbers of runs for 24 (80 percent) enterprises are fewer than expected number of runs. The highest difference is observed for EICL followed by NCML, NEIL, NBBL, UICL and ACEFIN. The z-value of these enterprises, except for ACEFIN, is significant.

The Z-statistic for most enterprises are negative further suggests that the observed numbers of runs are fewer than expected number of runs. The large negative and significant values on the banking enterprises with the large number of observations are also noteworthy. As Fama (1965) observed, however, that the absolute amount of dependence in price is more important than whether the dependence is positive or negative for most purposes. The amount of dependence implied by the runs test can be depicted by the size of the difference between the total actual number of runs and total expected numbers.

Table 3.23

Runs tests: weekly return on individual companies

This table lists statistics associated with the runs test of weekly return on listed companies. Runs test, being a non-parametric test, is a procedure that examines consecutive occurrence of a variable. This variable has only two categories. The runs test classifies values of the variable as being above or below the mean (test value). The test employs the total number of runs in the transformed data. Large significance values (p-value>0.05) indicate the data are randomly ordered. In the table 'N1' stands for the cases below mean, 'N2' stands for the cases above or equal to mean, 'N' for total number of cases, E(R) for expected number of runs and 'R' for observed number of runs. Any Z-value with * indicates the significant difference between actual number of runs and observed number of runs indicating that the series is not random.

S.N	Company	N_1	N_2	N	E(R)	R	Z-value	R/NR
1	Ace Finance Company (ACEFIN)	80	124	204	98.3	87	-1.66	R
2	Annpurna Finance Company (ANPF)	42	34	176	17.2	36	-0.60	R
3	Bishal Bazar Company (BBC)	65	94	159	77.9	79	0.19	R
4	Bank of Kathmandu (BOK)	193	216	409	204.9	206	0.11	R
5	Citizen Investment Trust (CIT)	118	173	291	141.3	139	-0.28	R
6	Everest Bank Limited (EBL)	229	237	466	233.9	211	-2.13*	NR
7	Everest Insurance Co. Ltd. (EICL)	136	227	363	171.1	161	-1.13	R
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	137	81	218	102.8	98	-0.70	R
9	Harisidhhi Brick & Tile Factory (HBTF)	144	79	223	103.0	88	-2.21*	NR
10	Himalayan Bank Limited (HBL)	246	246	492	247.0	236	-0.99	R
11	Himalayan General Ins. Ltd. (HGIC)	76	137	213	98.8	83	-2.36*	NR
12	Kathmandu Finance Limited (KFL)	120	201	321	151.3	144	-0.87	R
13	Nabil Bank Limited (NABIL)	242	262	504	252.6	228	-2.20*	NR
14	National Finance Co. Ltd. (NFCL)	144	78	222	102.2	95	-1.86	R
15	Neco Insurance Co. Ltd. (NEIL)	59	135	194	83.1	71	-2.06*	NR
16	Nepal Bangladesh Bank Ltd. (NBBL)	251	230	481	241.0	220	-1.93	R
17	Nepal Finance & Savings Co. Ltd.(NFSC)	94	114	208	104.0	101	-0.43	R
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	118	198	316	148.9	134	1.54	R
19	Nepal Insurance Co. Ltd. (NICL)	142	80	222	103.3	106	0.39	R
20	Nepal Investment Bank Limited (NIBL)	220	227	447	224.4	196	-2.70*	NR
21	Nepal SBI Bank Limited (SBI)	292	204	496	241.2	209	-2.99*	NR
22	NIDC Capital Market Limited (NCML)	191	96	287	128.8	132	0.43	R
23	People's Finance Limited (PFL)	113	201	314	145.7	148	0.29	R
24	Premier Insurance Co. Ltd. (PICL)	116	238	354	157.0	138	-2.29*	NR
25	Soaltee Hotel Limited (SHL)	140	79	219	102.0	102	0.00	R
26	Standard Chartered Bank Limited (SCBL)	229	245	474	237.7	192	-4.21*	NR
27	Taragaon Regency Hotel Ltd. (TRHL)	129	74	203	95.0	90	-0.77	R

28	Uniliver Limited (ULL)	117	180	297	142.8	129	-1.68	R
29	United Insurance Co. Ltd. (UICL)	132	206	338	161.9	142	-2.28*	NR
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	69	129	198	90.9	84	-1.09	R

* Significant at 5 percent

Table 3.24
Runs test: monthly return on individual companies

This table lists statistics associated with the runs test of monthly return on listed companies. Runs test, being a non-parametric test, is a procedure that examines consecutive occurrence of a variable. This variable has only two categories. The runs test classifies values of the variable as being above or below the mean (test value). The test employs the total number of runs in the transformed data. Large significance values (p-value>0.05) indicate the data are randomly ordered. In the table 'N_1' stands for the cases below mean, 'N_2' stands for the cases above or equal to mean, 'N' for total number of cases, E(R) for expected number of runs and 'R' for observed number of runs. Any Z-value with * indicates the significant difference between actual number of runs and observed number of runs indicating that the series is not random.

S.N	Company	N_1	N_2	N	E(R)	R	Z-value	R/NR
1	Ace Finance Company (ACEFIN)	43	60	103	51.1	42	-1.85	R
2	Annpurna Finance Company (ANPF)	49	71	120	59.0	52	-1.33	R
3	Bishal Bazar Company (BBC)	40	80	120	54.3	49	0.04	R
4	Bank of Kathmandu (BOK)	48	48	96	49.0	42	-1.44	R
5	Citizen Investment Trust (CIT)	47	65	112	55.6	47	-1.67	R
6	Everest Bank Limited (EBL)	57	54	111	56.5	50	-1.24	R
7	Everest Insurance Co. Ltd. (EICL)	57	62	119	60.4	39	-3.95*	NR
8	Gorakhkali Rubber Udyog Ltd.(GRUL)	77	42	119	55.4	48	-1.48	R
9	Harisidhhi Brick & Tile Factory (HBTF)	79	39	118	53.2	50	-0.67	R
10	Himalayan Bank Limited (HBL)	70	50	120	59.3	56	-0.63	R
11	Himalayan General Ins. Ltd. (HGIC)	40	78	118	53.9	49	-1.01	R
12	Kathmandu Finance Limited (KFL)	44	75	119	56.5	55	-0.75	R
13	Nabil Bank Limited (NABIL)	67	53	120	60.2	68	1.45	R
14	National Finance Co. Ltd. (NFCL)	51	68	119	59.3	54	-0.99	R
15	Neco Insurance Co. Ltd. (NEIL)	28	59	87	39.0	30	-2.22*	NR
16	Nepal Bangladesh Bank Ltd. (NBBL)	63	52	115	58.0	47	-2.08*	NR
17	Nepal Finance & Savings Co. Ltd.(NFSC)	40	77	117	53.6	47	-1.37	R
18	Nepal Housing & Dev. Fin. Co. (NHDFC)	43	72	115	54.8	59	0.83	R
19	Nepal Insurance Co. Ltd. (NICL)	76	43	119	55.9	47	-1.78	R
20	Nepal Investment Bank Limited (NIBL)	68	52	120	59.9	56	-0.73	R
21	Nepal SBI Bank Limited (SBI)	59	61	120	61.0	58	-0.55	R
22	NIDC Capital Market Limited (NCML)	48	72	120	58.6	47	-2.22*	NR
23	People's Finance Limited (PFL)	45	74	119	57.0	51	-1.17	R

24	Premier Insurance Co. Ltd. (PICL)	54	64	118	59.6	52	-1.41	R
25	Soaltee Hotel Limited (SHL)	75	45	120	57.3	60	0.54	R
26	Standard Chartered Bank Limited (SCBL)	67	53	120	60.2	62	0.34	R
27	Taragaon Regency Hotel Ltd. (TRHL)	30	37	67	34.1	28	-1.53	R
28	Uniliver Limited (ULL)	53	67	120	60.2	57	-0.59	R
29	United Insurance Co. Ltd. (UICL)	48	72	120	58.6	48	-2.03*	NR
30	Universal Fin. & Cap. Mkt. Ltd. (UFCML)	38	59	97	47.2	48	0.17	R

* Significant at 5 percent

The results of runs test are also similar to the findings of Poshakwale (1996), who finds that the actual number of runs significantly lower than expected number of runs for daily returns in India, Philippines, Malaysia, and Thailand. Dickinson and Muragu (1994) also find statistically insignificant values for majority of sample companies in Nairobi Stock Exchange.

Caution is required, however, when interpreting the significant results of runs test because the runs test is affected readily by trends. This is because the expected number of runs increases proportionately with the sample size, while the standard error increases proportionately with the square root of the sample size (Fama, 1965). This means that a constant but small percentage difference between the expected and actual numbers of runs will produce higher z - values as sample size is increased. The significant results of the runs test for some enterprises are nevertheless not at a level where they may be used to formulate profitable trading strategies when transactions costs are taken into account.

The summary results of the autocorrelation test and runs test are shown in Table 3.25.

Table 3.25

Summary results of autocorrelation and runs test

Variable	Returns Series	Autocorrelation Test		Runs Analysis	
		First Order	Lag 30	Non Random	Random
Market Return	Daily	R	NR	Yes	-
	Weekly	R	NR	Yes	-
	Monthly	R	NR	-	Yes
Individual Companies	Daily	17 (NR) 13 (R)	17 (NR) 13 (R)	13	17
	Weekly	12 (NR) 18 (R)	10 (NR) 20 (R)	10	20
	Monthly	3 (NR) 27 (R)	6 (NR) 24 (R)	5	25

The overall results show that daily and weekly market returns series are non - random both conformed by autocorrelation at lag one and up to lag 30 as well as by runs analysis. The autocorrelations of daily returns of the majority of the individual companies also reveal that Nepalese stock market is non - random. Monthly returns of both the market and individual companies indicate some kind of randomness supported by majority of the autocorrelations of the individual companies and results of the runs analysis. This indicates that Nepalese stock market contains predictable component if prices are considered on shorter frequency (such as day or week) but can not be predicted if longer horizons of returns are observed. Since the monthly observations are lowest among the return series and most of the listed enterprises are affected from thin trading, it is not realistic to state clearly that Nepalese stock market follows random walk model.

3.5 Discussion

The assumption that stock return series are random is basic to the efficient market hypothesis (EMH). The frequency distribution of the stock price series in

NEPSE does not follow a normal or uniform distribution, which is confirmed by Jarque-Bera (JB) test and non-parametric K-S test. The results of autocorrelation test indicate the non-random nature of the daily return series and violate the assumption of null hypothesis that the market is efficient in weak form. The runs test, too, does not support the independence of market return series. However, majority of selected enterprises provide some indication of randomness in stock return series.

In general, autocorrelation coefficients do tend to be small. When autocorrelation coefficients are relatively high, the null hypothesis that the series are random must also be rejected on the basis of the runs test. However, this situation does not occur very often. When the extent of randomness is further explored by individual enterprises, the evidence becomes more uncertain, since, in several instances, where an index has not appeared to follow random walk, some of that market's constituent shares displayed some degree of randomness. The results of this study also show these types of behavior in prices of individual enterprises.

While conventional wisdom suggests that mature stock markets are generally weak form efficient (Fama, 1965, 1970), conclusions for emerging markets are slightly more tentative. In these markets, a number of theoretical arguments support the rejection of the random-walk hypothesis. First, in thinly traded markets, the low level of competition and the subsequent dominance of some players may allow individual traders to set stock prices at levels significantly different from their intrinsic value. Second, the scarcity and uncertain validity of corporate information, the lack of auditing experience and the weaknesses of regulations and disclosure requirements lead to truncated fundamental information (Blavy (2002)). Third, a number of structural and institutional specialties such as the fragmentation of capital markets and the pressure of political and economic uncertainties may also account for departure form efficiency (El-Erian and Kumar (1995)).

The results of this study are similar with the findings of Nourredine Khaba (1998), Roux and Gilberson (1978), and Poshakwale (1996) who find the evidence of non-randomness stock price behaviour and the market inefficiency on the Saudi Arabian financial market, Johannesburg Stock exchange and Indian market respectively. While at the same time it contradicts findings with Ojah and Karemera (1999), Branes (1986), and Dickison amd Muragu (1994), which document the evidence of weak form efficiency and can not reject the random walk hypothesis on the four Latin American countries market, Kuala Lumpur stock exchange and the Nairobi Stock exchange respectively.

The overall results from the empirical analysis suggest that the stock market of Nepal is not weak form efficient. However, the results presented in the study are not above limitations such as the aspects of profit making strategy was not investigated in detail using any technical trading rules or adjusting transaction cost (such as bid ask spread, brokerage fee, time lag of settlement procedures) and as a result no conclusion in this regard has been provided.

At the same time, non-synchronous trading may bias the results. The problems of non-trading are, however, try to overcome by considering the individual company's daily return series and runs test. The results of individual share returns evidenced, however, that these are following random walk model to some extent. The results of the study should be interpreted cautiously because the presence of autocorrelation violates the assumption of random walk model not necessarily mean inefficiency. If the random walk hypothesis holds, the weak form of the efficient market hypothesis must hold, but not vice versa. Thus, evidence supporting the random walk model is the evidence of market efficiency. But violation of random walk model need not be evidence of market inefficiency in the weak form (Ko and Lee, 1991).

The possible autocorrelation find in the return series not necessarily mean that the returns are predictable (Cuthbertson, 1996). It might be due to the presence of noise traders in the market (Uruttia, 1995) trading by investors whose demand for stocks is determined by factors other than their expected returns may provide explanation for this. However, a lower degree of efficiency on less developed countries markets might be due to common characteristics of loose disclosure requirements, thinness and discontinuity in trading (Errunza and Losq, 1985). It might be due to the institutional factors such as illiquidity, market fragmentation, trading and reporting delays and absence of official market makers (Butler and Malaikah, 1992) or due to the delay in operations and high transaction cost, thinness of trading and illiquidity in the market (Nourrendine Khaba, 1998).

Nevertheless, measures of return behaviour may be useful in research on the determinants and behaviours of flows into the stock market. The major implication of the study can be pointed out as follows:

- Firstly, the predictive ability is interesting for investors to beat the market using trading rules.
- Secondly, if the autocorrelation present in the analyses not necessarily means the rejection of weak form efficiency is still helpful to implement the regulatory change to prevent the bias mentioned above and to improve the overall market conditions and encourage savings and investments. The need to change the appropriate index calculation method considering the infrequent trading should be a suggestion to the responsible authorities.
- Thirdly, the study provides the time series behaviour of a less developed market. It is also a matter of interest that despite the well documented potential benefits of investing in the ESMs, a lack of adequate information appears to be a major factor hindering the foreign investment in these markets.
- Finally, it is interesting to academic researchers and explores avenues for future research. Predicting model for forecasting the future based on the past and whether the deviation are large enough to exploit profitably considering transaction costs remain open question for should be an issue for further research.

Thus, the descriptive statistics, autocorrelation test and runs test indicate that Nepalese stock market does contain historical price data and volume information by rejecting the random walk hypothesis. In the next chapter, an attempt has been made to seek any profitable investment strategy focusing on the seasonal components. More specifically, the next chapter deals with calendar effects in Nepalese stock prices along with size effects the return on calendar months/day of the week.

Chapter IV

CALENDAR EFFECTS IN NEPALESE STOCK MARKET

In chapter III, random walk hypothesis has been tested using autocorrelation and runs analysis. The rejection of random walk hypothesis implies that the participants in the market may develop the investment strategy with information contained in the historical price data. This result persuades further to investigate whether the market possesses seasonal component in return series. This chapter is an attempt to seek such an anomalous behavior in stock market in Nepal, as appeared in other markets in the name of January effect, Monday effect and the like.

As such, anomalies are empirical results that seem to be inconsistent with maintained theories of asset pricing behavior. They indicate either market inefficiency (profit opportunities) or inadequacies in the underlying asset-pricing model. After they are documented and analyzed in the academic literature, anomalies often seem to disappear, reverse or attenuate. This raises the question of whether profit opportunities existed in the past, but have since been arbitraged away, or whether the anomalies were simply the statistical aberrations that attracted the attention of academicians and practitioners.

The efficient market theory claims that all available historical, public and private information is embedded in security prices and as a consequence investors cannot make profits by taking advantage of erroneous market assessments. In other words, since there are no mispriced securities, beating the market and obtaining capital gain is not possible. In the early eighties, many studies were undertaken to check the validity of such an efficient market theory. However, the inconsistent result obtained were not actually used to prove the theories' weaknesses or refute it, but dealt as a sort of divertissement. It was only in the late eighties that researchers acknowledged, accepted and dealt with the existence of anomalies.

In light of such observations, studies began to analyze equity returns trying to link anomalous returns with recurring periods of time. This led to the birth of a new research area based on calendar anomalies, in which an anomaly is any event that cannot be explained using efficient market theory or any ordinary theory prevailing in finance literature.

4.1 Introduction

Seasonality is defined as the cyclical behavior that occurs on a regular calendar basis. The existence of calendar or time anomalies is a contradiction to the weak-form efficient market hypothesis. The weak form of EMH states that the market is efficient in past price and volume information and stock movements cannot be predicted using this historic information. This form infers that stock returns are time-invariant, that is, there is no identifiable short-term time based pattern in security prices. The existence of seasonality (monthly or daily) effects in domestic and international markets suggest a market inefficiency, in that investors should be able to earn abnormal rates of return incommensurate with the degree of risk.

A number of seasonal patterns have been detected in stock return data such as the weekend effect documented by French (1980) and Gibbons and Hess (1981). In general, these studies revealed the average weekend returns on stocks to be negative. Turn of the month effect is documented by Ariel (1987) indicated that higher mean stock returns occur during the initial days of the month than during days later in the month. Keim (1983) documented a strong seasonal pattern for small firms where returns in January differ significantly from the returns from other months of the year. For small firms, January brings higher stock returns with much of this gain occurring in the first five trading days of the month. Large firms, on the other hand, experience negative returns during this period. Therefore, a turn-of-the-year effect appears to be a small firm phenomenon. This characterization, however, does not appear to hold for the weekend or turn-of-the-month seasonal patterns observed in stock returns data.

To further document market patterns, Lakonishok and Smidt (1988) examined daily data on DJIA for the presence of seasonal components. The findings of the study supported the persistence of seasonal trends around the weekend, turn-of-the-month and holidays. Lakonishok and Smidt (1988) do not detect a difference in January from other time periods, due possibly to the fact that the DJIA consists primarily of large firms.

The studies on monthly effects, generally confirmed the January and year-end effect, which is related to tax-loss selling strategies and behavioral aspects. One explanation of the higher returns in January is the tendency to realize losses in December to reduce the taxable speculative gains. Another effect is window dressing that is related to institutional trading. Institutional investors tend to sell losers in December to avoid reporting to many losers in their portfolios at the year-end. In Nepalese context, however, neither the December is the last month of the year, nor do institutional investments play important role compared to other stock markets. Consequently, above-mentioned explanation for the year-end effect does not apply in Nepalese stock market. This study tries to find year-end effect using Nepalese stock market data taking into account of its cultural and behavioral aspects.

There is a large body of literature on the day-of-the-week effect on stock returns. The empirical results showed that day-of-the-week effects are a common phenomenon across different countries and different types of markets. Trading days in Nepal, on the other hand, are not uniform from other markets. In Nepal, weekday begins from Sunday and close in Friday. Nepal Stock Exchange opens the floor for transaction from Sunday to Thursday. This special character of Nepalese stock market makes an investigation of the day-of-the-week effect promising. Further, the speculative behavior and the dominance of small shareholders could explain the day-of-the-week effect.

The purpose of this chapter is to investigate the calendar effect in Nepalese stock market thereby using index data and individual stock returns of the Nepal Stock Exchange listed companies. Besides providing as somewhat static picture on the calendar effects, which has not been done thoroughly thus far, the study focuses on the size effect on calendar months and day-of-the-week. As Haugen and Jorion (1996) pointed out that one should expect the calendar effects are short-term phenomenon due to the learning of market participants. If investors based on past experience are aware of calendar anomalies and can run trading strategies, such effect should disappear over time.

The rest of the chapter is organized as follows. Section 4.2 documents evidences against EMH- especially literatures on seasonal pattern- those explain the calendar anomalies of stock price behavior. Section 4.3 introduces the data set and discusses the construction of portfolio and uses of individual and market index data for analyzing the current calendar effects. Section 4.4 takes care of the month-of-the-year effect with descriptive analysis followed by regression analysis on both index and portfolio data. Day-of-the-week effects are discussed and analyzed in section 4.5. Finally, a discussion over the results summarizes our main findings in section 4.6.

4.2 Evidence against EMH: A survey of calendar anomalies in financial literature

Calendar anomalies occur when there is a meaningful temporal change. This may occur yearly, weekly or daily and such phenomenon are well known and they can be easily identified. However, detractors have doubted their usefulness using measures to test robustness to claim that such tests are limited to small samples of capital or only for short time windows. Skeptics claim that existence of an anomaly is not always based on a meaningful economic explanation, while empirical tests are often less than convincing.

A further question regards transaction costs. In the event that one could exploit a market anomaly for a profit, the relative transaction costs would erode the profit margin. Transaction costs can flatten net returns and thus make it difficult to measure the volatility produced by market anomalies.

Most of the calendar anomalies are not new phenomenon; indeed they are well documented, especially for the mature stock markets. Each anomaly related with calendar effects have been reviewed in this chapter.

(a) Month-of-the-year (January) effect

Despite years of concerted research, the January effect, which is the tendency of stock prices to rise in January relative to December, remains an unexplained anomaly of the finance literature. Wachtel (1942) was the first economist to examine and document seasonality in the DJIA from 1927 to 1942. The study observed frequent bullish tendencies from December to January in eleven of the fifteen year. Over the three decades later, Rozeff and Kinney (1976) conducted study to examine seasonality in U.S. stock market and revealed statistical significant differences in mean returns among months.

Keim (1983) reports that risk adjusted January returns are especially pronounced for small firms, and Roll (1983) shows that fifty percent of the excess return occurs during the first four trading days of January and the last trading day in December (or the turn of the year). Chan and Chen (1988) and Handa *et al*. (1989) show that the size effect is insignificant when betas are estimated over long horizons. This suggests that the January effect is evidence of return seasonality rather than a misspecification of capital asset pricing model (CAPM).

One explanation for the turn of the year seasonality is the tax-loss selling hypothesis. This hypothesis states that investors wanting to realize capital losses in the current tax year create downward price pressure, at year-end, on securities that have previously experience negative returns. Subsequently, at the beginning of the new tax year, this selling pressure is relieved and the affected securities earn excess returns as their prices rebound. The portfolio window dressing hypothesis of Haugen and Lakonishok (1988) represents an alternative, but not necessarily mutually exclusive, explanation for the January effect. However, the two hypotheses are difficult to differentiate because they both rely on year-end selling pressure in losing stocks, and both predict a January effect concentrated at the turn of the year. One difference is that the tax loss-selling hypothesis implies no return seasonality prior to the introduction of personal income taxes.

The tax loss-selling hypothesis was further examined by Schultz (1985) and Jones *et al*. (1987). Schultz (1985) examined the turn-of-the-year (the next to last trading day of December through the eighth trading day in January) returns of a small firm portfolio and the Dow Jones Industrial Average (DJIA) for each year from 1900 to 1929. The small firm portfolio included all stocks listed in the Wall Street Journal, from all exchanges, with a bid price of five dollars per share or less. In addition, Schultz's study computed nine-day returns on the DJIA and a small firm portfolio for several non-January periods. The analysis indicated that prior to the War revenue Act of 1917, the turn of the year returns of the small firm portfolios were not significantly different from the DJIA benchmark. Furthermore, the study showed that before 1917, the turn-of-the-year returns of the small firm portfolios were not different from the returns of the non-

January periods. However, it has been observed that after 1917, the turn-of-the-year returns of the small firm portfolios were significantly higher than the corresponding benchmark returns. Consequently, Schultz's study was unable to reject tax-loss selling as a viable explanation for the turn-of-the-year effect.

Jones *et al*. (hereafter referred to as JPW (1987)) re-examined the issue by using the monthly price series of the Cowles Commission Industrial Index. The index price was computed by value weighting of the monthly high and low price of each stock in the index. The study detected a January seasonal in the monthly returns of the index for the periods before and after the War Revenue Act. Consequently, it was concluded that the simultaneous occurrence of the January effect and the turn of the tax year is a mere coincidence.

Jones *et al*. (1991) further investigated the January anomaly by using a more comprehensive data set in order to determine the unsettled issue of whether the January and turn-of-the-year effects existed before the introduction of personal income taxes. The study used an equally weighted version of the Cowles Industrial Index to determine if the turn-of-the-year or January effect existed before the introduction of personal income taxes in 1917. The analysis indicated that, in the pre-tax period the turn-of-the-year returns of index are not significantly greater than the returns for the DJIA or the June-July turn of the month. However, these differences are highly significant in the post-tax period. Additional evidence indicated that only in the post tax period did stocks with relatively high tax-loss selling potential earn significantly larger turn-of-the-year and January returns than stocks with lower tax-loss selling potential. Similar results were found for low price stocks versus high price stocks. The study finally concluded that net turn-of-the-year returns of the post tax period were significantly greater than those of the pre-tax period.

While the January effect is observed in many countries, some countries such as the United Kingdom, New Zealand, and Hong Kong (Agrawal and Tondon, 1994) and Australia (Brown *et al.*1983) have months other than December as the tax-year end. Hence, it has been argued the tax-loss selling explanation cannot be the sole determinant of the January effect. However, the January effect is mainly located in small stocks in particular and there appears to be an interaction between small-firm premium and the January effects.

Some studies have argued that some of the other calendar anomalies play an important role in the manifestation of the January effect. The interaction of calendar effects could potentially obscure the observation of seasonalities in the stock price returns, thus the importance of isolating these effects. For example, half of the small-firm premium in January returns occurs in the few days of January (Keim, 1983), while the day-of-the-week effect has been observed to occur primarily or entirely during the month of January (Rogalski, 1984). Furthermore, it has been argued that the January effect may have more recently moved into November and December. This has been attributed to the requirements that mutual funds report their holdings at the end of October, and from investors buying in anticipation of gains in January. It has led to the notion that the January effect may have moderated or relocate to the other months of the year in recent periods. Nevertheless, January has historically been the best month for stocks across all markets. A few countries have returns in January that are greater than the average return for the whole year (Agrwal and Tondon, 1994); in general, this tends to be large and positive in most countries (Gultekin and Gultekin, 1983).

Bouman and Jacobson (2002) documented a new time of the year anomaly. The study showed that monthly index returns are significantly lower during the six months from May until October than the remaining half-of-the-year from November to April. The study was motivated this splitting of the year by reference to an old market saying, "Sell in May and go away," that is frequently mentioned in the European financial press. The results are typically for the period from 1970 to 1998, which postdates the market folklore. The average index return for Nov/Apr is higher than for May/Sep for 36 of the 37 countries studied. Many of the differences are statistically significant. The study provided evidences that the differences are not a rediscovery of the January effect. The average differences in one –month returns are 0.9%, 2.0%, and 1.5% respectively, for the US, the UK and the Japan.

(b) Day-of-the-week (weekend) effect

One of the most puzzling empirical findings reported in finance is day-of-the-week effect. The day-of-the-week effect is the unequal daily mean returns observed for financial securities. More specifically, it refers to the existence of a pattern on the part of stock returns whereby these returns are linked to the particular day-of-the-week. Monday has been shown to be the "worst" performing day, as the returns on Monday for US stocks tend to be below the norm for the other days of the week. Fields (1931) is credited with the first study documenting this "weekend effect", at a time when stocks were traded on Saturdays. Several early studies such as Cross (1973), Keim and Stambaugh (1984) and Lakonishok and Smidt (1988) have found higher stock index returns occurring on Friday.

French (1980) observed that the average return to the Standard and Poor's (S&P) composite portfolio was relatively negative over weekends in the period 1953-1977. The study examined the two alternative models of the process generating stock returns: the calendar time hypothesis and the trading time hypothesis. Under the calendar time hypothesis, the process operates continuously, and, since the return for Monday represents a three-calendar-day investment, the expected return for Monday will be three times the expected return for other days of the week. Under the trading time hypothesis, returns are generated only during active trading. Since any of the returns represents only one trading day, if this model is correct the expected return will be the same for each day-of-the-week. The study, further, test whether the systematically negative returns occur only on Monday or any day that the market is closed, the returns for days following holidays are compared with the returns for periods which do not include holidays. Only Tuesday's average "holiday" return was lower than its average non-holiday return, indicating that the negative expected returns are caused by a weekend effect and not by a general "closed-market" effect. After French (1980) documented the unusual stock returns over weekends, numerous studies confirmed the Monday (or weekend) effects using various time periods and different stock return indexes. This anomalous Monday return pattern exists not only in the US stock market but also in other stock markets such as Japan, Canada, Australia and UK (Jaffe and Westerfield, 1985; Chang *et al.*, 1993) and across different types of securities.

Numerous explanations have been developed to rationalize the puzzling discovery of persistent negative daily returns. Lakonishok and Levy (1982) attribute the effect to the delay between trading and settlements in stocks and in clearing checks. However, the study also reported that only about 17 percent of the abnormally low Monday returns can be explained by the settlement period. Keim and Stambaugh (1984) reported that neither measurement error nor specialist related explanations could explain the Monday effect.

Lakonishok and Maberly (1990) document that individuals tend to increase trading activity (especially sell transactions) on Monday, which they believe might explain part of the weekend effect. Kamara (1995) provides evidence that individual trading is an important cause of Monday seasonal by noting that the magnitude of the Monday effect for the S&P 500 declined significantly over the 1962-1993 period, a period of increased institutional trading activity. However, Sias and Starks (1995) reported that the day-of-the-week patterns in returns and volumes are more pronounced in securities in which institutional investors play a greater role.

Rogalski (1984), among others, documented that the average negative Monday return occurs during the non-trading period from Friday's close to Monday's opening (the weekend effect). The study used the open and close values of Dow Jones Industrial Average (DJIA) index for every trading day during the period October 1, 1974 to April 30, 1984. In addition, the study also obtained opening and closing Standard & Poor's Composite Index (S&P 500) values for the period December 29, 1978 to December 9, 1983. The trading and non-trading day returns had been examined in an attempt to better understand the Monday effect. The study revealed that the Monday effect is actually a non-trading weekend effect. It was further documented that the Monday and non-trading weekend effects are directly related to the January effect. The study also showed that Monday average returns in January are positive and related to firm size but during the rest of the year are negative. In addition, returns for all days of the week are related to firm size when looking at January returns separately. The findings also include that a large portion of the magnitude of the day of the week/January/size effect occurs during the first five days of January. Thus, the January and turn-of-the-year effects appear to dominate the Monday effect. It was further documented that average returns on holiday weekends are related to firm size if the holiday occurs on a Monday but no relation is appeared if the holiday occurs on a Friday. Two-day returns over Tuesday, Wednesday and Thursday holidays are on average related to firm size, but the mean returns over a Thursday holiday are relatively larger in magnitude.

Along this line of thought, Damodaran (1989) showed that firms tend to report bad news on Fridays and suggested that the delay of announcements of bad news might cause the negative Monday effect. The study argues that differences in the Monday effect in the United States for large and small firms result partly from slow market responses to adverse information announced by small firms after the close of trading on Fridays. In Damodaran's Table 5, the lagged response to such announcements has a significant impact on Monday returns only for firms with market values of $200 million or lower. It was, thus, concluded that adverse news releases by small firms might explain part of the day-of-the-week effect in the United States. However, the study reported that the delay of announcements of bad news on Friday can only explain a small proportion (approximately 3.4 percent) of the weekend effect. Given the available evidence, the Monday effect is still viewed as an anomaly that cannot be fully explained.

Wang *et al*. (1997) showed that the Monday effect occurs primarily in the last two weeks of the month. That is, after excluding the last two weeks of the month, the average return for the first three weeks is not significantly different from zero. The study employed a total of three types of indexes for the analyses: the NYSE-Amex equally-and value-weighted returns indices, the Nasdaq equally and value-weighted return indices, and S&P composite index. The NYSE-Amex indices span the period from July 3, 1962 to December 31, 1993, which includes a total of 1530 Monday returns. The Nasdaq return indices cover the period from January 2, 1973 to December 31, 1993 and include a total of 1016 Monday returns. The S&P composite index spans the period from January 4, 1928 to December 31, 1993, which includes a total of 3220 Monday returns. The study showed that the well-known Monday effect is largely caused by the Mondays of the fourth and fifth weeks of the month during the 1962-1993 periods. The average Monday return for the first three weeks is not significantly negative. It was also observed that the difference between the mean returns of the first-half of the month and the second-half of the month is not significantly different from zero when Monday returns are excluded.

Jaffe and Westerfield (1985) examined daily stock market returns for the US, UK, Japan, Canada and Australia. The study compiled a daily record of returns for stock market indexes of Japan, Canada, Australia, the UK, and the US and reported the weekend effect in each country. In contrast to previous studies of the US, it was observed that the lowest mean returns for both the Japanese and Australian stock markets occur on Tuesday. The study further evidenced that there is a significant independent seasonality in the return distributions of each country after allowing for the common effects of the US stock market. It was also examined that the daily foreign exchange rates for each country to determine if an integration of foreign currency markets with stock markets may help to explain the day-of-the-week effects - in particular, if they offset the common stock returns to the US investor. The study concluded that foreign investors confront a weekend effect in their respective stock markets independent of the weekend effect in the US and seasonality found in foreign exchange do not offset the season in the foreign stock markets.

Jaffe and Westerfield (1985), in another study, investigated the day-to-day behavior of stock market returns for Japan. The study reported a pattern different from the one in the United States. For example, the lowest mean return for the Japanese stock market occurs on Tuesday. It was also uncovered the weak evidence that the Japanese seasonal is closer to the US seasonal led by one day, than it is to the contemporaneous US seasonal. The study did not observed either measurement error or settlement procedures can explain the weekly seasonal in Japanese returns. It was, however, revealed that the seasonal in yen does not offset the seasonal in Japanese common stocks and also reported no evidence of a reverse day of the week effect in Japan during January.

Chang *et al*. (1993) examined the robustness of international day-of-the-week effects using daily returns of 22 non-US indices and on a US index, taken from the FT-Actuaries World Indices. The analysis extended from January 1, 1986 through April 30, 1992. The study reported that US day-of-the-week effect become insignificant with either sample size or error term adjustment alone. In contrast, equities in seven European countries –France, Italy, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom- and Canada and Hong Kong exhibited day-of-the-week effects that are robust to individual sample size or error term adjustments. Day-of-the-week effects in France, Italy, the Netherlands, Spain and Sweden survive the simultaneous imposition of sample size and error term adjustments. The study, however, noticed that the effects are not uniformly strong across calendar weeks. Most frequently, the effect is statistically significant in more than two-weeks out of the month.

There are some studies on the day-of-the-week effect using the patterns of intra-daily stock price behavior. Among them are the Prince (1982), Harris (1986), and Smirlock and Starks (1984). Prince (1982) examined daily returns in Dow Jones 65 stock composite index (January 1960 to December 1964) which were computed from hourly values of that index as well as from closing values. The negative Monday effect appears primarily in the close-to-close returns, and only to a lesser extent in returns measured from intraday prices. Although the study concluded that the effect might be caused at least partly by systematically high Friday closing prices, it failed to interpret the fact that Friday-open-to-Monday-open returns appear normal while Monday-open-to-Tuesday-open returns are negative.

Harris (1986) examined systematically weekly and intra-daily price patterns using fourteen months of the complete transaction record of the NYSE. The study observed that there are cross-sectional differences in weekday patterns found in both trading and non-trading period returns. For large firms, the negative Monday close-to-close return accrues between the Friday close and the Monday open. For small firms, it accrues during the Monday trading day. Further decomposition of the trading-period return into series of 15-minute intraday returns reveals that there are only significant differences among weekdays during the first 45-minutes of trading. On Monday mornings, prices tend to drop, while on the other weekday mornings, they rise. Otherwise, the study reported that, price patterns are similar on all weekdays.

Smirlock and Starks (1984) analyzed hourly returns in the DJIA (January 1963 to December 1983). The study revealed that intraday patterns related to the day-of-the-week effect have changed over time. In the first third of their sample, Monday returns in the first hour of trading are positive while returns occurring later in the day are negative. In the last third of their sample, this pattern is reversed. There are negative returns early in the day on Monday and positive returns later.

The "weekend effect" is considered as having two parts. The first, the "weekend drift effect" is that stock prices tend to decline over weekends but rise during the trading week. Cross (1973) observed that the stock prices tend to decline over weekends in the three-day interval from Friday's close to Monday's close. At first this was attributed a "Monday effect" but Rogalski (1984) reported that the entire decline occurred between Friday's close and Monday's open and that the open to close returns on Mondays were non-negative. Harris (1986) further refined this showing that prices tended to decline during the first 45 minutes of Monday trading, but to recoup the loss over the remainder of Monday. Dyl (1988), using S&P 500 futures, showed that significant price changes are more likely to occur over weekends than during the trading week, and that price declines were more likely over weekends than intraweek.

The second part of the weekend effect, the "weekend volatility effect" is that the volatility of returns over weekends is less per day than the volatility over continuous trading days. Though the notion of price evolution over a period without trading seems oxymoronic, investors do receive and process information during periods when markets are closed. If the information arriving per day over weekends is of the same quantity and consequence as intraweek news, the implicit price movements over weekends should be the same as the explicit movements during the week. Thus, if σ is the volatility over a day from close-to-close during a week, then the volatility from close to close over a weekend should be $\sigma \sqrt{3}$.

French and Roll (1986) examined the descriptive statistics for returns over all common stock traded on the NYSE and AMEX. The study reported that the volatility over entire weekends was only about 10 percent greater than the intraweek volatility. This translated to a per day volatility over weekend well below the intraweek daily volatility. Thus even though information might be arriving during Saturday and Sunday, either the frequency of its arrival or the volatility of returns that was so below that prices behaved as if investors ignored any weekend information, treating Monday as if it were a trading day contiguous to Friday.

The weekend drift effect has received the most attention in the literature. Miller (1988) attributed the negative returns over a weekend to a shift in the broker-investor balance in decisions to buy and sell. During the week, Miller argued, investors, too busy to do their own research, tend to follow the recommendations of their brokers, recommendations that are skewed to the buy side. However, on weekends, investors, free from their own work as well as from brokers, do their own research and tend to reach decisions to sell. The result is a net excess supply at Monday's opening. Miller's hypothesis was supported by evident showing that brokers do tend to make buy recommendations, by evidence that odd-lot transactions tend to be net sales, and by data showing that odd-lot volume is particularly high and institutional volume is particularly low on Mondays. Thus, individual investors tend to sell on Monday's when the lack of institutional trading reduces liquidity. Ziemba (1993) provided evidence that the same phenomenon exists in Japanese stock market.

Another explanation for the negative weekend effect is that stock prices close "too high" on Friday's or "too low" on Mondays. One variant attributes unusually high Friday closing prices to settlement delays. The delay between the trade date and the settlement date creates an interest free loan until settlement. Friday buyers get two extra days of free credit, creating an incentive to buy on Fridays and pushing Friday prices up. The decline over the weekend reflects the elimination of this incentive. This hypothesis is supported by the intraweek behavior of volume and returns: Friday is the day with the greatest volume and with most positive stock returns.

A second variant, the dividend exclusion hypothesis, argues that Mondays prices are "too low" if ex-dividend dates for common stocks tend to cluster on Mondays. Virtually all studies of the weekend effect ignore dividend payments when calculating daily returns. This creates a bias toward stock price decline over weekends if ex-dividend dates do cluster around Mondays. Any ex-dividend effects would be realized very early on Monday, after which positive returns occur on rest of Monday. The evidence cited above suggests some supports for this pattern.

According to yet another hypothesis, the information release hypothesis, information released during the week tends to be positive and information released over weekends to be negative. A firm with good news will release it quickly so investors can bid the stock prices up, but bad news is an orphan hopefully hidden from investor scrutiny by release after the Friday close.

Abraham and Ikenberry (1994) observed support for a serial correlation hypothesis. Monday's price performance is conditional on Friday's performance. A strong Friday tends to be followed by positive weekend returns while only one-third of the Fridays, in their sample, show price decreases these dominate the Monday results, suggesting that bad Fridays are given heavy weight in Monday trades. This observation is consistent with small investors who initiate Monday morning trades being particularly sensitive to poor performance on Fridays.

It should not be ignored a final hypothesis, that there is no economic rational to justify the persistence of a negative weekend drift. Rather, it might be an anomaly that was hidden from the eyes of the investors but brought to light by the data mining of academics. If this is the case, the weekend effect should have disappeared after its discovery and diffusion.

(c) Turn-of the-month (half-month) effect

Daily stock returns have been found to be higher in the first half of the trading month. The tendency of common stock returns for the second half-month to be significantly below the first half of calendar month is labeled as the half-month effect. Using stock market indices over the period 1963 to 1981, Ariel (1987) conducted the seminal study on this effect. The study's definition of the first part of the month includes the last trading day of the previous month to the first eight trading days of the month, a total of nine trading days, while the last half of the month consists of nine trading days before the last trading day of the month. Using the CRSP value–weighted stock indices over the period 1963-1981, the study reported an average rate of return of 0.826 percent for the first part of the month and a negative average rate of return of -0.182 percent, during the second part of the month i.e., positive rates of return occur in the stock market only during the first half of each month.

Agrawal and Tondon (1994) subsequently confirm the effect in other international markets. Studies such as Hensel and Ziemaba (1996) have refined this test to show that stocks consistently have higher returns on the last day and first four days of the month. The study noted that from 1928 through 1993, returns at the turn-of-the-month were significantly above average, and "the total return from the S&P 500 over this sixty-five year period was received mostly during the turn of the month". One explanation provided by the authors is that the effect is due to the bulk of cash flows occurring at the end of the month (salaries, interest payments, etc.) Thus, the study suggests that investors, especially those making regular purchases, may benefit by investing prior to the turn-of-the-month.

Lakonishok and Smidt (1988) defined the first half of the month as the first through the fifteenth calendar day of the month, if it is a trading day, or if not through the next trading day. The last half of the month consists of the remaining days. The study provided mild support for the idea that rates of return are larger in the first half-of-the-month than in the last half. Moreover, it was reported that Ariel's evidence of a higher average rate of return during the first half of the month appears to be partly the results of idiosyncratic characteristic of the period and partly the result of including the last trading day of the previous month as part of the first half of the month.

(d) Holiday effect

The holiday effect causes higher than normal returns to be observed around holidays mainly in the pre-holiday period. Lakonishok and Smidt (1988) showed that roughly half of the gain in the Dow Jones Industrial Average during the 10 pre-holiday trading days in each year. Using equal and value weighted portfolios for the United States stock market, Ariel (1990) showed that over one third of the positive returns each year are made in the eight trading days prior to market closed holiday. This clearly suggests that the frequency of pre-holiday positive return days are significantly higher than the frequency of positive return days for all the other trading days over the period. Cadsby and Ratner (1992) reported evidence of significant pre-holiday effect for a number of stock markets, with the European markets being the exception.

Two possible explanations for the holiday effect are presented by Fabozzi *et al*. (1994). The first is that the effect may be part of the other seasonalities that have already been documented. This is pertinent in situations where holidays occur primarily on specific days of the week or in specific periods such as the beginning or end of the month. This means that a vital part of ascertaining whether there is truly a holiday anomaly is to eliminate the possibility that the holiday is capturing other calendar effects. The second explanation is that the higher pre-holiday returns are a result of positive holiday sentiment. This occurs when people look forward to the holiday period, are optimistic and focused on non-work activities, and hence are reluctant to trade or close out positions on stock that they hold. Interestingly, U.S. evidence showed that it is only on public holidays, when the exchange is closed, that significant pre-holiday abnormal returns occur.

Chan *et al*. (1996) consider the holiday effect within a cultural context for the stock exchanges of Malaysia, Singapore, India and Thailand. The study reported a stronger holiday effect around cultural holidays compared to state holidays with no cultural origin. Notably, the Kuala Lumpur, Singapore and Bombay stock exchanges all show significant, positive abnormal returns around cultural holidays. Cadsby and Ratner (1992) observed that cultural holidays, such as the CNY, are related to economically significant abnormal returns in Hong Kong, Japan, Malaysia, Singapore, and Taiwan province of China. The findings point to the existence of a "cultural effect" within the holiday effect, at least in Asian stock markets.

(e) The good day sunshine effect

As a result of this effect, listed price variations not only depend on fundamental analysis but rather on psychological aspects concerning investor mood in relation to the weather. Hirshleifer and Shumway (2003) have claimed that climate and atmospheric conditions may influence operators' mood. The study believed in fact that investors who live in towns with a favorable climate have an optimistic view of life and are subsequently readier to take decisions on more likely to interpret market news positively. In their test, Hirshleifer and Shumway surveyed a sample of cities hosting stock exchanges and compared cloudy and sunny days. The test revealed that in 18 out of 26 towns there was a negative relationship between cloudiness and returns. If one ignores market imperfections, it may be possible to discern a relationship between moods and market trends. More specifically, Lowstein (2000) has emphasized the role of emotions in economic behavior. Thus judgment and subsequent actions by investors, while undoubtly sustained by economic motivations, appear to be influenced by feelings and emotional reactions when new information emerges on the market. The fact that there is relationship between mood and the weather is well known and is investigated by a branch of psychology. It has been shown that when the climate is favorable (mild), our morale gets better.

Saunders (1993) observed quotes on New York Stock Exchange presenting negative trends in connection with a cloudy day, in the absence of bad news at the micro-or macro-economic level.

Should this conclusion prove irrefutably true, portfolio managers will have to invest only on sunny stock exchanges. The fact that this does not happen stands as a counter example about the emotional impact of clouds on stock returns.

(f) The daylight saving effect

Kamstra *et al.* (2000) analyzed a special weekend effect: the daylight saving effect which happens on Monday as well, but only twice a year; when a one-hour saving is introduced in Spring and the same is suspended in Autumn, with both cases potentially affecting investors moods on the markets. This anomaly in this case is explained by the alteration of the standard sleeping cycles. The magnitude of this effect is increased by the fact that over the last 100 years, portfolio managers have reduced their average sleeping time by about two hours. This has contributed to higher stress and angriness levels. Considering that sleep is so important to maintain a satisfying level of lucidity in social relationships, not surprisingly a loss or an alteration of sleeping times might greatly affect the decision skills and ability to act in a timely manner as requested of every proficient portfolio managers. The loss of sleep may be even more meaningful during the initial stages of market negotiations because it shows down the whole bodies' responsiveness and consequently a delay on getting onto the market with the proper sentiment increases traders' stress.

Within the perspective of the weekend effect, the alteration of the natural sleeping cycle might have an amplified impact on the volatility of prices observed on Friday in comparison with those observed on Monday. This phenomenon may be noted in several countries (Belgium, Brazil, Canada, New Zealand, Switzerland, and the United states), despite their differences in the volumes traded and equinox locations. Daylight saving time was introduced for the first time in the USA by Benjamin Franklin in 1784 and has been applied with regularity since the First World War. It is in effect between the end of March and the beginning of October.

Kamstra *et al*. (2000) verified daylight saving time regards three indexes-S&P 500, the Toronto Stock Exchange and Dax 100-for the period of 1928-1997, 1969-1998 and 1973-1998 respectively. The results were based on a t-test which checked whether average weekend returns characterized by a time change were different from those observed during a standard weekend. The test revealed that the average for a time-change weekend is more negative than the regular weekend average as well as the effect is stronger in autumn than in spring, when an hour of sleep is lost. It is further reported that the effect is greater when using equally weighted indexes rather than value-weighted indexes and the magnitude of daylight saving effect increases as the market dimensions increases.

The study received rigorous criticism from Pinegar (2002). It showed that the difference between average regular weekend return is meaningful only in autumn. In the study's test, it was observed a broader time range, from January 1967 to December 1998 and implemented separate tests for autumn and spring. Analysis has shown that, although there is some variation of returns in concurrence with time change weekends, the difference does not appear to be extremely meaningful. Moreover, apart from the magnitude of the effect, its attribution exclusively to differences in sleeping habits is questionable, since momentary international crises might also explain such anomalous returns.

However, Kamastra *et al.* have claimed that Pinegar's insights might only apply to Dax 100, maintaining his claim for the statistical significance of the other indexes. This being the case, it may be stated that a loss of sleep as a result of the daylight saving time change might have an impact on market returns.

(g) Further effects

In recent periods new tests have appeared to analyze anomalies in market returns. One extremely surprising test claims to explain anomalous trends as a consequence of sport events. In particular, Boyle and Walter (2001) hypothesize, without a robust demonstration that winning performance by the New Zealand national rugby team (called All Blacks) may influence traders' mood to such a point as to boost market prices on the New Zealand Stock Exchange. To support the thesis, the study cited previous work showing how the relationship between sport performance and mood can affect work attitudes.

On the basis of previous work, Kamastra *et al.* (2003) have introduced the so-called seasonal affective disorder (SAD) to the field of finance. Prior to their work, this pathology had been studied within a psychological context as a change in behavior induced by seasonal changes and producing depressive states as a consequence of daylight reduction. The authors have proven that the returns decrease at the winter solstice in concurrence with the reduction of daylight and increase again after the solstice. A reduction of daylight causes difficulty with mental concentration, a loss of bodily strength, disturbances during sleep and a need of carbohydrates and sugars, followed by an increase in weight.

Several psychological studies have proven that depression related to shortened days also entails an increase in risk aversion. Specifically, the lowest returns appear in autumn, when investors modify their portfolio allocations to privilege risk free assets. It is important to stress that multiple psychological factors affect individual mood, but the most meaningful one is daylight duration.

Kamastra *et al.*(2003) test also shows how SAD is related to geographical latitude and its impact is greater in countries far from the equator, where the most significant variations in daylight duration occur in comparison with other areas. As a consequence of this phenomenon, one might be tempted to sell short on Scandinavian markets (during spring or summer) while being long on Australian market (during autumn or winter) to take advantage of seasonal differences and daylight variations between the Northern and Southern hemispheres.

Though the previous studies have supported anomalous behavior of stock returns in many countries, these puzzles are still to be uncovered in developing stock markets like of Nepal. More specifically, Nepal is a country with unique calendar year based upon Vikram Sambat, unique fiscal year and many public holidays primarily religious and cultural. Political instability and transition in the country has also affected the working days of the stock market due to strikes and "Nepal Bandhs". In such background, this study highlights the month-of-the-year effect and day-of-the-week effect along with size effect on calendar month and days of the week in Nepalese stock market.

4.3 Data and research methodology

Calendar effects are tested in Nepalese stock market to identify the month-of-the-year and day-of-the-week effect. All these tests have been carried out using the Nepal Stock Exchange Index (NEPSE) and size-sorted portfolio. This section deals with the sources of data, the model and construction of portfolio for the empirical analysis.

(a) Data base and selection of enterprises

This study is entirely based upon the secondary source of data collected from Nepal Stock Exchange. Daily NEPSE index and closing prices of selected listed enterprises were collected from Nepal Stock Exchange. Other relevant data were also collected from concerned listed companies selected for the purpose of the study.

This study has utilized two sets of data: index returns and return on size-sorted portfolio. In Nepal, only one index is available for analysis called Nepal Stock Exchange Index (NEPSE). The only stock exchange in Nepal has started to list securities for trading purposes in floor from 13th January 1993. Most of the equity securities and a few bond and mutual fund units are trading in the NEPSE. Along with Index return, five size-sorted portfolios were also constructed to further the analysis of size effect on month-of-the-year and day-of-the-week in Nepalese stock market.

(b) NEPSE Index

This study employs the daily NEPSE index return for the period 1995 through 2005. Seasonality as well as monthly effects is more easily detected in market indexes and large stock portfolios than in individual share prices (Officer, 1975). NEPSE index is published by Nepal Stock Exchange and includes all the listed stocks. This index is a performance measurement benchmark for Nepalese stock market and is generally accepted for an economic indicator.

NEPSE index is market-weighted average without dividend yields. It reports closing prices in local currency. US studies have linked much of the January effect to the small firm (Keim, 1983). International studies have found that small firms achieve higher rates of return than large companies, with this effect being particularly evident in the month of January (Aggarwal *et al.* 1990). Therefore, utilization of an equally weighting index in performing statistical analysis will magnify anomalies related to small firms. In this study, however, there is no choice except market weight NEPSE to utilize for empirical analysis.

This study utilizes 2344 daily index return from 17th July 1995 to 16th July 2005 covering 10 years period. Further, Government of Nepal has introduced capital gain tax effective from 17th July 2001 and Sunday trading sessions were eliminated from 29th August 1999. These two dates are important to decompose the data into sub-groups. The month-of-the-year effect has been analyzed for pre-2001 and post-2001 period along with overall period. The division of sub-period on the basis of effective implementation of capital gain tax provides the explanation for the existence of the month-of-the-year effect in relation to tax-loss selling hypothesis. Similarly, the elimination of Sunday trading sessions also provide us a convenient point for partitioning day-of-the-week effect into two sub-periods: pre-1999 and post-1999. Thus, month-of-the-year effect is reported for overall period, pre-and-post 2001 sub-periods and week-of-the-day effects are reported for pre-and-post-1999 sub-periods along with entire period throughout this chapter.

(c) Portfolio Construction

Gibbons and Hess (1981) suggest that the Monday effect is related to firm size. Keim and Stambaugh (1983) actually test the Gibbons and Hess suggestion and observed that the Monday effect is similar for all size portfolios. Keim and Stambaugh, however, don't segment the size portfolios into Januarys versus the rest of the year to see if the Monday effect is related to the January effect. To examine this day-of-the-week/Month-of-the-year/firm-size issue returns of portfolios based on year-end market value of equity are used. Data are obtained from the Nepal Stock Exchange Limited for period 1996-2005.

Five size-sorted portfolios have been constructed using the stocks listed in Nepal Stock Exchange. The time series of price of the 30 enterprises as selected on the basis of their market capitalization, volume of transaction, period covered, and representation from different sector of economy and frequency of trading in chapter III are also utilized for the purpose of constructing portfolio for the purpose of this chapter. Five portfolios are formed on the basis of market capitalization containing six stocks in each portfolio. Portfolio one represents smallest portfolio and portfolio five is the largest one. The stocks included in each portfolio are given in Appendix-26.

(d) The Hypotheses

In this study, the testable hypotheses relating to calendar effects are:

- The mean returns for each month of the year are not significantly different from zero. In other words, investors do not yield abnormal returns in each month of the year.

- The mean returns for each month of the year are equal. In other words, there is equality of mean returns across the calendar month of the year.

- The mean returns for each portfolio are equal in each month. In other words, there is no size effect in returns of each calendar month.

- The mean returns for each day of the week are not significantly different from zero. In other words, investors do not yield abnormal returns in each day of the week.

- The mean returns for each day of the week are not equal. In other words, there is equality of mean returns across the day of the week.

- The mean returns for each portfolio are equal in each day of the week. In other words, there is no size effect in the returns of the day of the week.

(e) Method of analysis

Index returns and portfolio returns are categorized by day-of-the-week and month-of-the-year for the period 1996-2005 and two sub-periods. Daily close-to-close returns are computed as the natural logarithm of the ratio of successive closing indexes and stock prices. Thus,

$$R_t = LN\left(\frac{NEPSE_t}{NEPSE_{t-1}}\right) * 100$$

Where, R_{it} is continuously compounded rate of return in the stock market index. $NEPSE_t$ is the index at time period 't' and $NEPSE_{t-1}$ is the index at time period 't-1'.

Similarly, portfolio return has been computed assigning equal weights in returns of each of the individual company.

The mean return and its associated t-statistic, the standard deviation, the regression model, and the F-statistic are described in section 4.4.

4.4 Analysis of month-of-the-year effect

This section consists of the analysis and findings related to the month of the year effect in Nepalese stock market. The analysis has been made using the index return data and portfolio of stock constructed on the basis of size (i.e. market capitalization).

(a) Descriptive statistics

Table 4.1 provides mean, standard deviation, t-statistic, significant (probability value) and number of observations when 120 monthly NEPSE index return observations are categorized by the calendar months for 1996-2005 and for sub-periods. Panel A of the table shows that January anomaly does not exist in Nepalese stock market. The mean return in January, though not statistically significant, however, has been observed positive (0.54 percent). Out of the 12 monthly returns, majority (8 months) of the returns are positive. The negative returns are observed for the months February, May and December. The highest positive return has been observed for October (3.05 percent) followed by July (2.14 percent), June (1.92 percent) and November (1.77) percent. On the other hand, highest negative return has been observed for December (-2.80 percent) followed by February (-1.75 percent) and May (-0.21 percent)

Table 4.1

Mean month of the year returns

The data for this table are from the Nepal Stock Exchange index files. Panel A of the table reports the mean, standard deviation, t-statistic of month-of-the-year returns for overall period. Panel B and panel C of the table report for sub-periods: pre-2001 and post-2001. Mean stands for average return for the respective month-of-the-year. 'N' stands for number of observations. 'SD' stands for standard deviation and measures the volatility of the returns. The t-value represents whether the monthly mean returns are significantly different from zero. The p-value is the lowest significance level at which a null hypothesis can be rejected. The null hypothesis is the mean returns for each month of the year are not significantly different form zero.

Panel A: Average percent return from close to close for NEPSE index by month-of-the-year, 1996-2005

Month	N	Mean	SD	t- value	p-value
January	10	0.54	3.84	0.45	0.67
February	10	-1.75	9.68	-0.57	0.58
March	10	0.47	6.35	0.24	0.82
April	10	0.15	5.90	0.08	0.94
May	10	-0.21	4.61	-0.14	0.89
June	10	1.92	4.05	1.50	0.17
July	10	2.14	3.48	1.94	0.08
August	10	1.26	7.75	0.52	0.62
September	10	0.26	3.63	0.23	0.83
October	10	3.05	3.08	3.13	0.01
November	10	1.77	4.63	1.21	0.26

December	10	-2.80	3.42	-2.59	0.03

Panel B: Average percent return from close to close for NEPSE index by month-of-the-year (Pre-2001)

Month	N	Mean	SD	t-value	prob.
January	6	0.72	3.13	0.56	0.60
February	6	-2.15	11.0	-0.48	0.65
March	6	1.97	5.42	0.89	0.41
April	6	2.31	5.26	-1.07	0.33
May	6	-0.68	5.09	-0.33	0.75
June	6	2.86	4.48	1.56	0.18
July	6	1.33	4.08	0.80	0.46
August	6	3.3	7.32	1.10	0.32
September	6	1.58	3.98	0.97	0.38
October	6	3.89	3.44	2.77	0.04
November	6	3.22	5.31	1.49	0.20
December	6	-2.21	3.81	-1.42	0.21

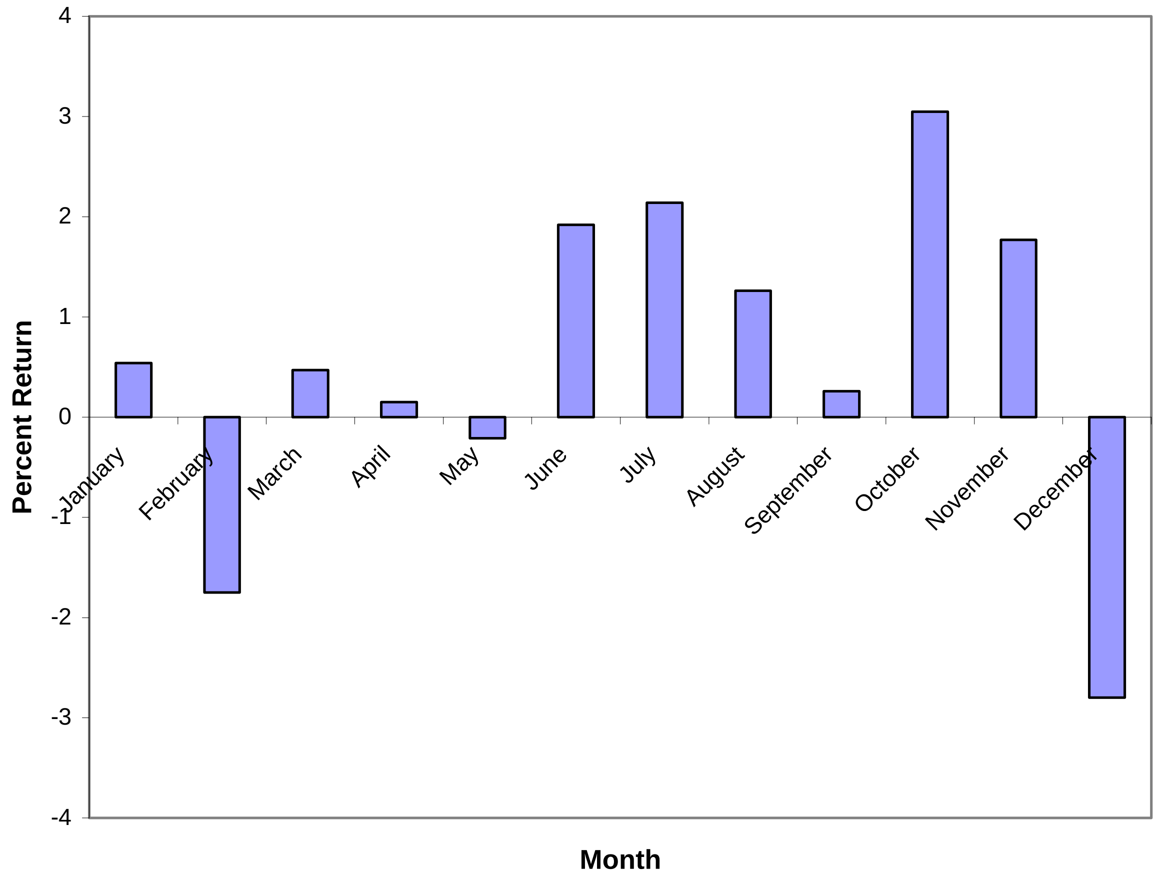
Panel C: Average percent return from close to close for NEPSE index by month-of-the-year (Post-2001)

Month	N	Mean	SD	t- value	p-value
January	4	0.27	5.27	0.10	0.92
February	4	-1.16	8.88	-0.26	0.81
March	4	-1.78	7.79	-0.46	0.678
April	4	3.85	5.27	1.46	0.24
May	4	0.51	4.42	0.23	0.83
June	4	0.51	3.36	0.30	0.78
July	4	3.35	2.32	2.88	0.06

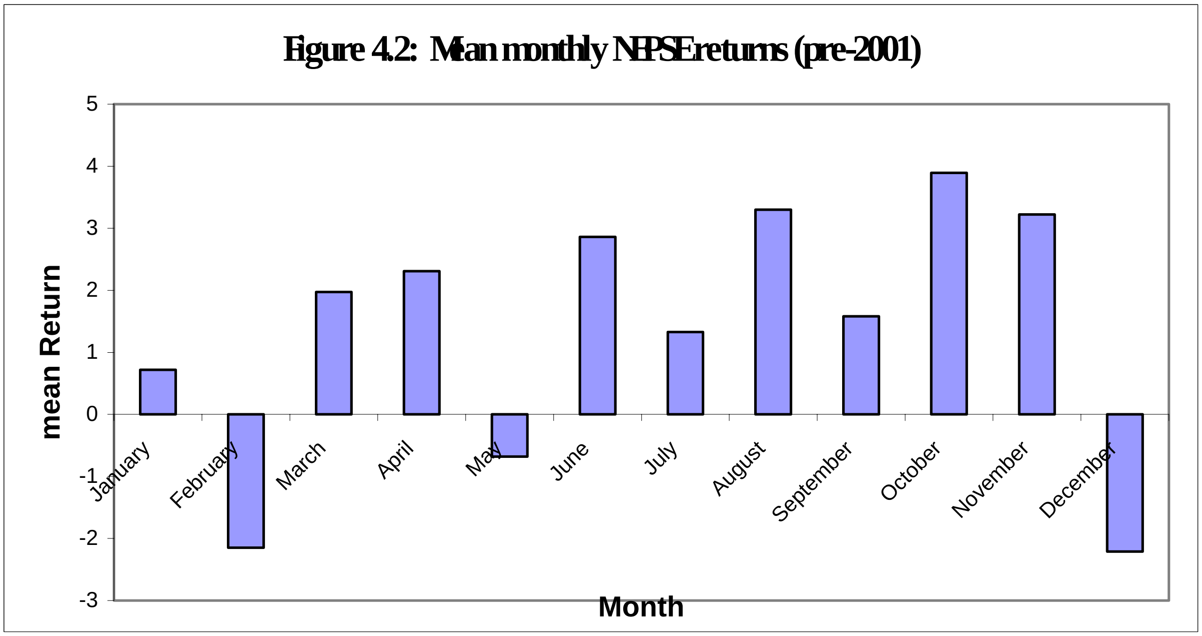
August	4	-1.78	8.39	-0.42	0.70
September	4	-1.72	2.11	-1.62	0.20
October	4	1.79	2.31	1.55	0.22
November	4	-0.41	2.63	-0.31	0.78
December	4	-3.68	3.03	-2.43	0.09

The results further indicate that October returns are significant and positive which is not consistent with January anomaly. However, the significant negative December return is consistent with the findings of US studies. As mentioned earlier, January is not a beginning month of the calendar in Nepal, so tax loss hypothesis does not support in Nepalese contest. The fiscal year in Nepal begins with Mid-July somewhat explains the hypothesis by the positive July return with comfortable level of significance (i.e. at 10 percent).

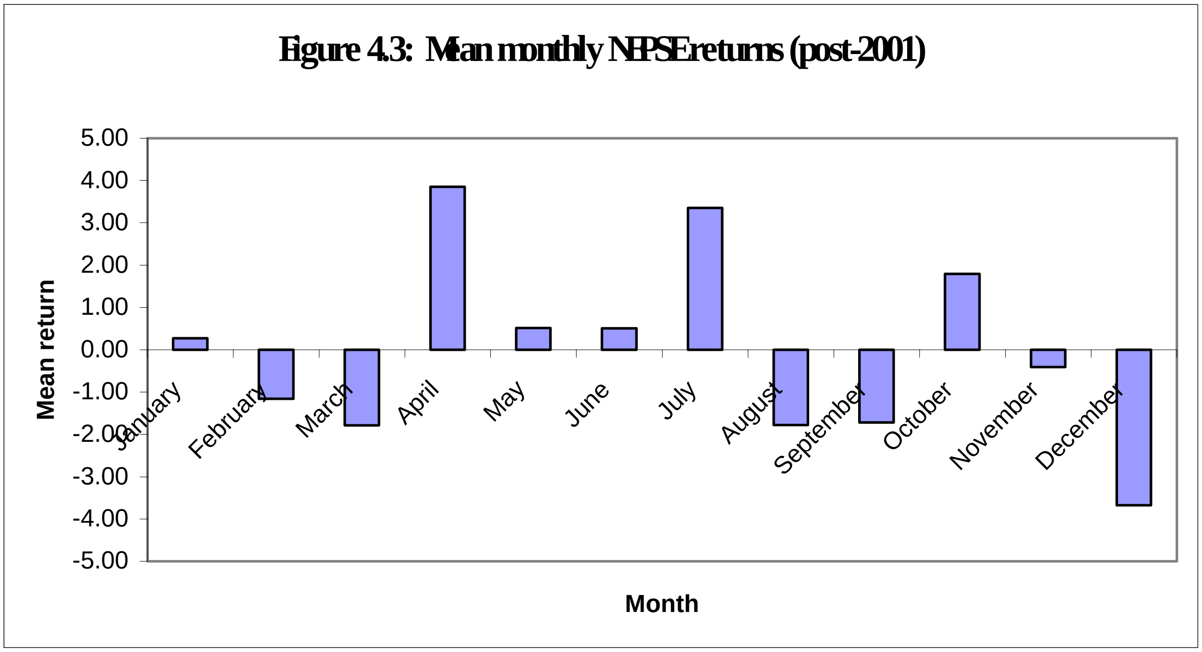
Figure 4.1: Mean monthly NEPSE returns (1996-2005)



Consistent with the results of overall period, the mean returns for sub-period pre-2001 does not provide support to the January effect in Nepalese stock market as exhibited in panel B of the table. The mean January return is 0.72 percent which is not significant. The February, May and December posted negative returns, highest negative being –2.21 percent in December followed by –2.15 percent in February and –0.68 percent in May. The highest positive return has been observed 3.89 percent for October which is only the significant return for the sub-period. Thus, October anomaly has been further supported by the pre-2001 returns.



However, Panel C of the table provides results which are not consistent with the overall period and sub-period post-2001. Still January effect has not been observed though there is positive (0.27 percent) return on the month. April posted highest positive (3.85 percent) return which is not significant. Then, July recorded the significant positive (3.35 percent) return indicating the presence of July anomaly in Nepalese stock market which is consistent with the tax-loss selling hypothesis. Further, December is the month of significantly highest negative returns with –3.68 percent followed by March and August (each with –1.78 percent), September (–1.72 percent), February (-1.16 percent) and November (-0.41 percent).



Thus, the results from NEPSE index return show that:

- There is no January effect in Nepalese stock market.
- October is the month which recorded highest positive and significant return for whole period and pre-tax period.
- July anomaly has also been observed for whole period and post tax period.
- December is the month with highest negative return for entire period and sub-periods though insignificant in pre-tax period.

(b) Regression analysis

The hypothesis of efficient market further assumes that market returns follow a geometric random walk, that is, the logarithmic market indices follow a random walk. If the efficient market hypothesis were true, one would expect that monthly effects do not exist. The first difference, namely the market returns of stock exchange 'i' at time't' labeled r_{it} are stationary. Inserting a set of dummy variables denoted 'd_j' controls for monthly effects. January has been used as reference month.

$$r_{it} = \alpha_i + \sum_{j=1}^{11} \beta_{ij} d_j + \varepsilon_{it}$$

$$\text{i.e., } R_{it} = \alpha_i + \beta_{i1} D_{2t} + \beta_{i2} D_{3t} + \beta_{i3} D_{4t} + \dots\dots\dots\dots + \beta_{i11} D_{12t}$$

The variable d_j takes a value of one if the return occurs on 'j' month and zero if the return occurs on the month other than 'j' month. Since January is a reference month, the coefficient α_i measures the mean return for January and the coefficients β_1 through β_{11} measures the difference between the mean return for each month of the year and mean return for January. ε_{it} is a random error term.

The regression model is tested for the null of equality of means, i.e. mean return for each month of the year is equal. Thus, null hypothesis is Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \dots\dots\dots\dots = \beta_{11} = 0$. In other words, if the expected return is the same for each month of the year, the estimates of β_1 through β_{11} will be close to zero and F-statistic measuring the joint significance of the dummy variables should be insignificants. The significance of the coefficient of at least one dummy variable confirms that there is no equality of mean returns across the calendar months of the year. Alternatively, the model can be specified regressing the returns on twelve monthly dummies and testing for the equality of all parameters without any constant term.

Table 4.2

Regression coefficients for the month-of-the-year effect in Nepalese stock market
(NEPSE index return)

This table provides the results of regression analysis, dependent variable being return on market as measured by logarithmic change in NEPSE indexes for the overall, pre-2001 and post-2001 period. Coeff. are the coefficients of intercept and monthly dummies. The associated t-value and p-values measures the significance of the coefficients. Since January is the reference month, the intercept (α_i) measures the mean return for January, the coefficients β_1 through β_{11} measures the difference between the mean return for each month of the year and mean return for January. The R^2 and Adj R^2 value measures the goodness of fit of the fitted sample regression line. F-test measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Coefficients	Overall period			Pre-2001			Post-2001		
	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value
α	0.54	0.32	0.75	0.72	0.32	0.75	0.27	0.10	0.92
β_1	-0.23	-0.95	0.34	-2.88	-0.89	0.38	-1.43	-0.39	0.70
β_2	-0.07	-0.03	0.98	1.25	0.39	0.70	-2.05	-0.06	0.58
β_3	-0.39	-0.16	0.87	-3.04	-0.94	0.35	3.58	0.97	0.34
β_4	-0.75	-0.31	0.76	-1.41	-0.44	0.66	0.24	0.06	0.95
β_5	1.38	0.57	0.57	2.14	0.62	0.19	0.24	0.06	0.95
β_6	1.60	0.66	0.51	0.62	0.80	0.43	3.08	0.83	0.41
β_7	0.73	0.30	0.76	2.58	0.27	0.79	-2.05	-0.55	0.58
β_8	-0.28	-0.12	0.91	0.86	0.98	0.33	-1.99	-0.54	0.59
β_9	2.51	1.04	0.30	3.17	0.78	0.44	1.52	0.41	0.68
β_{10}	1.23	0.51	0.61	2.51	0.51	0.61	-0.68	-0.18	0.86
β_{11}	-3.34	-1.38	0.17	-2.94	-0.91	0.37	-3.95	-1.07	0.29
R^2		0.086			0.156			0.181	
Adj R^2		-0.006			0.001			-0.070	
F	0.938		0.507	1.007		0.452	0.721		0.711

Table 4.2 provides the results of regression analysis for the overall period and sub-periods. The results are in consistent with the null of no difference in means, i.e. the mean returns of each month of the year are uniform. The coefficient β_1 through $\beta_{11}$are not significantly different from zero and the F-statistic is insignificant for overall period and sub-periods. This indicates that there is no month of the year effect in Nepalese stock market. Further, it has been observed that the differences between the returns for December and January (as measured by β_{11}) are highest for overall period and post-2001 period. However, for pre-2001 period, this difference has been observed highest for October. Interestingly, coefficients for January (for overall period and sub-periods are positive) and insignificant at conventional level of significance.

(c) Portfolio analysis

The relationship between the capitalization of the firm and seasonality in its stock return is well documented (see, Keim, 1983). It has been observed that average returns for small firms are substantially higher in January. Therefore, to further examine the month-of-the-year effect for different market value portfolios, five portfolios with different capitalization are considered. These portfolios are denoted by PF1, PF2 …..and PF5, where PF1 contains the lowest and PF5 contains the highest capitalized stocks.

Table 4.3 provides the result of the mean returns of five-portfolios for overall period (1996-2005). The mean January returns for all the portfolios, except in portfolio one (the smallest portfolio), is negative. The highest negative return has been observed for portfolio three (-1.96 percent) which is significant at conventional level, followed by portfolio four (-1.46 percent) and portfolio two (-1.23 percent). Further, July and October are only the months in which positive returns are observed for all the portfolios. Note that, July returns for overall portfolio and portfolios one, three and five are significant along with October returns for overall portfolio, and portfolios three and five.

The highest mean return has been observed for portfolio one (8.17 percent) followed by 5.25 percent in portfolio three for the month of July and 3.76 percent in portfolio five for the month of October. On the other hand, highest negative mean return has been observed for portfolio four in the month of December (-3.73 percent) followed by -2.65 percent in March for portfolio Five. Interestingly, February returns for all the portfolios are negative.

Table 4.3
Average percent return from close to close for size-sorted portfolio
by month-of-the-year, 1996-2005

This table reports the mean return of each month of the year for size-sorted portfolios for the period 1996 through 2005. The overall represents the mean return for each month of the year for overall portfolio i.e. portfolio of thirty listed companies. The PF1, PF2, PF3, PF4 and PF5 are the mean returns for the portfolios of listed companies based upon their market capitalization, PF1 being the smallest portfolio and PF5 being the largest one. The significance of the mean return are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from zero.

Month	Overall	PF1	PF2	PF3	PF4	PF5
January	-0.92	0.25	-1.23	-1.96**	-1.46	-0.22
February	-1.20**	-1.29	-0.90	-1.47	-0.20	-2.14**
March	0.88	2.42	3.04**	-0.11	1.66	-2.62
April	0.62	-0.77	-1.26	1.15	2.38	1.60
May	-0.09	0.53	-1.16	0.71	0.28	-0.78
June	0.63	0.03	-0.36	0.95	-0.35	2.88
July	4.06***	8.17*	2.89	5.25*	0.53	3.41**
August	0.76	0.60	0.48	-1.25	1.28	2.65**
September	-0.14	-1.02	0.49	-0.51	0.46	-0.14
October	1.48**	0.78	0.07	0.86**	1.92	3.76***
November	1.12*	2.85	-0.23	0.30	-0.84	3.51***
December	-1.27*	-0.49	1.28	-1.36	-3.73**	-2.04

To analyze the size effect in month of the year effect the following regression equation with dummies is carried out:

$$R_{it} = \alpha_i + \beta_{i1}D_{2t} + \beta_{i2}D_{3t} + \beta_{i3}D_{4t} + \beta_{i4}D_{5t} + e_t$$

Where, R_t is the mean return of the stock portfolio on the month 't'. The variable did takes a value of one if the return occurs on 'i' portfolio on month 't' and zero if the return occurs on the portfolio other than 'i' (d_{2t} = portfolio 2, d_{3t} = portfolio 3, d_{4t} = portfolio 4, d_{5t} = portfolio 5). Further, α_i measures the mean return for portfolio one for each month and coefficients β_1 through β_4 measure the difference between the mean return for each portfolio and the mean return for portfolio one. 'e_t' is the random error term.

The regression model is tested for the null hypothesis:

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ against the alternative hypothesis that mean return for each portfolio is not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the portfolios. Further the significant F-value also led to the conclusion of size effect in the returns of calendar months in the year.

The results of regression analysis are presented in Table 4.4. For the overall period, the size effect has been observed for the two months: July and November. Out of five coefficients, four are significant and F-value is also significant for the month of July. Similarly, three coefficients and F-value is also significant for the month of November. Further, one of the coefficients in October and June are observed significant.

It is noteworthy that July is the month of closing the books of accounts i.e. month of fiscal year end in Nepal. In October and November, Nepal observes great festival 'Dhashain' and 'Tihar'. The size effect indicates that the larger the portfolios, the returns on these months are significantly different from small portfolio.

The significant coefficients in these months are negative indicating the small firm size effect on these calendar months of the year. In other words, in the month of July and November, small portfolio yields significantly higher returns than in larger portfolio to the investor.

The mean returns for each portfolio for pre-2001 period are exhibited in Table 4.5. Consistent with the results of overall period, in pre-2001period (hereafter pre-tax), the highest positive return has been observed for the month of July (8.67 percent) in smallest portfolio (PF1) followed by 6.82 percent in July for PF3. The highest negative return, on the other hand, has been observed for PF4 (-2.69 percent) in the month of December followed by PF2 (-2.39 percent) in May. The mean return in the month of February has been observed negative for the overall portfolio. On the other hand**,** the mean return in the month of September and October are observed positive for the entire portfolios.

Table 4.4

Regression coefficients for the size-effect in calendar months in Nepalese stock market (overall period)

This table provides the results of regression analysis, dependent variable being return on each month of the year for the period 1996 through 2005. Since portfolio one (PF1) is the reference portfolio, the intercept (α_i) measures the mean return for PF1, the coefficients β1 through β4 measures the difference between the mean return for other portfolios and mean return for PF1. The significance of the coefficients are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from each other. The R^2 and Adj R^2 value measures the goodness of fit of the fitted sample regression line. F-test measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Month	α_i	β_1	β_2	β_3	β_4	Adj R^2	F-Value	p-value
January	0.25	-1.48	-2.21	-1.71	-0.47	-0.07	0.51	0.73
February	-1.29	0.39	-0.18	1.09	-0.85	-0.08	0.48	0.75
March	2.42	0.62	-2.53	-0.76	-5.04	0.08	1.63	0.20
April	-0.77	-0.49	1.92	3.15	2.37	0.05	1.36	0.28
May	0.53	-1.69	0.18	-0.25	-1.31	-0.09	0.42	0.79
June	0.03	-0.39	0.92	-0.38	2.85*	0.06	1.47	0.24
July	8.17***	-5.28**	-2.92	-7.63***	-4.75**	0.28	3.88	0.01
August	0.60	-0.12	-1.85	0.68	2.05	0.00	0.99	0.43
September	-1.02	1.51	0.51	1.48	0.88	-0.11	0.30	0.88
October	0.78	-0.71	0.08	1.14	2.98*	0.11	1.91	0.14
November	2.85**	-3.08***	-2.55	-3.69**	0.66	0.23	3.17	0.03
December	-0.49	1.77	-0.87	-3.24	-1.55	0.12	2.03	0.12

The months those are observed significant in pre-tax period are March, June, July August, September, October, November and December. As explained, March is the last month of the calendar year in Nepal. June, July and August are the month of ending and beginning of Fiscal year. In September, October and November Nepalese observe their greatest festival 'Dashain' and 'Tihar'. Moreover, Nepalese celebrates these festivals with the longest national leave.

The size effect is further analyzed in the month-of–the-year using the following regression equation with dummies in pre-tax period:

$$R_{it} = \alpha_i + \beta_{i1}D_{2t} + \beta_{i2}D_{3t} + \beta_{i3}D_{4t} + \beta_{i4}D_{5t} + \mathrm{e_t}$$

Where, R_t is the mean return of the stock portfolio on the month 't'. The variable did takes a value of one if the return occurs on 'i' portfolio on month 't' and zero if the return occurs on the portfolio other than i (d_{2t} = portfolio 2, d_{3t} = portfolio 3, d_{4t} = portfolio 4, d_{5t} = portfolio 5). Further, α_i measure the mean return for portfolio one for each month and coefficients β_1 through β_4 measure the difference between the mean return for each portfolio and the mean return for portfolio 1. 'e_t' is the random error term.

Table 4.5

Average percent return from close to close for size-sorted portfolio by month-of-the-year, pre-2001

This table reports the mean return of each month of the year for size-sorted portfolios for the period 1996 through 2001. The overall represents the mean return for each month of the year for overall portfolio i.e. portfolio of thirty listed companies. The PF1, PF2, PF3, PF4 and PF5 are the mean returns for the portfolios of listed companies based upon their market capitalization, PF1 being the smallest portfolio and PF5 being the largest one. The significance of the mean return are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from zero.

Month	Overall	PF1	PF2	PF3	PF4	PF5
January	0.21	2.25	0.03	-0.78	-1.28	0.82
February	-1.28	-0.18	-1.57	-1.79	-1.27	-1.55
March	2.69**	4.38	5.04**	0.17	4.28	-0.45
April	0.14	-0.25	0.06	0.98	1.87	-1.96
May	-0.24	0.65	-2.39	0.89	0.6	-0.94
June	0.75	0.61	-0.29	1.23	-1.83	4.01**
July	4.61***	8.67***	4.16*	6.82**	-0.98	4.38***
August	2.89***	4.92	-0.24	1.46	2.98	5.31***
September	1.77*	0.79	0.71	0.69	5.42*	1.2*
October	2.73	1.62	1.50	1.99**	3.64*	4.88***
November	2.60**	6.39*	-0.30	1.71	0.19	5.01***
December	-0.17	-0.18	3.03	-0.71	-2.69*	-0.31

The regression model is tested for the null hypothesis:

Ho: β1 = β2 = β3 = β4 = 0 against the alternative hypothesis that mean return for each portfolio is not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the portfolios. Further the significant F-value also led to the conclusion of size effect in the returns across the calendar months in the year.

Table 4.6 reports the regression coefficients for the size effects in MOY in Nepalese Stock market. In pre-tax period, the coefficients and F-value both are significant only in the month of July, the month of fiscal year end. The coefficients are significant in other months viz. March, August, October and November. These months are culturally important, either for the calendar year end or for 'Dashain' and 'Tihar'. Thus, in pre-tax period the size effect has been observed significant in July.

Table 4.6

Regression coefficients for the size-effect in calendar months in Nepalese stock market (pre-2001)

This table provides the results of regression analysis for pre-2001 period, dependent variable being return on each month of the year. Since portfolio one (PF1) is the reference portfolio, the intercept (α_i) measures the mean return for PF1, the coefficients β1 through β4 measures the difference between the mean return for other portfolios and mean return for PF1. The significance of the coefficients are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from each other. The R^2 and Adj R^2 values measure the goodness of fit of the fitted sample regression line. F-test measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Month	α_i	β_1	β_2	β_3	β_4	**Adj R^2**	**F-Value**	**p-value**
January	2.25	-2.22	-3.04	-3.53	-1.43	-0.04	0.73	0.58
February	-0.18	-1.39	-1.61	-1.09	-1.37	-0.14	0.13	0.97
March	4.38*	0.66	-4.21	-0.10	-4.83	0.05	1.38	0.27
April	-0.25	0.31	1.23	2.12	-1.71	-0.08	0.48	0.75
May	0.65	-3.04	0.24	-0.05	-1.59	0.00	1.03	0.41
June	0.61	-0.90	0.62	-2.44	3.40	0.05	1.33	0.29
July	8.67***	-4.51*	-1.85	-9.65***	-4.29	0.29	3.91	0.01
August	4.92**	-5.16	-3.46	-1.94	0.39	0.01	1.06	0.40
September	0.79	-0.08	-0.10	4.63	0.41	-0.01	0.95	0.45
October	1.62	-0.12	0.37	2.02	3.26*	0.05	1.39	0.27
November	6.39***	-6.69**	-4.68	-6.20*	-1.38	0.09	1.74	0.17
December	-0.18	3.21	-0.53	-2.51	-0.13	0.04	1.28	0.31

The post-2001 period mean returns for overall portfolio and portfolio one through five are reported in Table 4.7.For the post-2001 (hereafter post-tax) period, the highest positive return has been observed in the month of July (7.00 percent) for smallest portfolio (PF1) followed by 6.95 percent in April for largest portfolio (PF5) and 3.08 percent in July for PF3. The highest negative, on the other hand, has been observed on March (-5.87 percent) for largest portfolio followed by –5.36 percent in December for PF4 and –4.50 percent in December for PF5. Interestingly, returns in the month of January and September are all negative for all the portfolios and returns in the month of July are all positive for all the portfolios. The returns are significant in the month of January, February, March, April, July, August, September, October, November and December.

Table 4.7

Average percent return from close to close for size-sorted portfolio by month-of-the-year, Post-2001

This table reports the mean return of each month of the year for size-sorted portfolios for the period 2001 through 2005. The overall represents the mean return for each month of the year for overall portfolio i.e. portfolio of thirty listed companies. The PF1, PF2, PF3, PF4 and PF5 are the mean returns for the portfolios of listed companies based upon their market capitalization, PF1 being the smallest portfolio and PF5 being the largest one. The significance of the mean return are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from zero.

Month	Overall	PF1	PF2	PF3	PF4	PF5
January	-2.41**	-2.23	-3.1***	-3.38	-1.53	-1.76
February	-1.28**	-2.99	-0.59	-0.95	1.17	-3.02*
March	-1.47	0.17	0.21	-0.71	-1.12	-5.87*
April	1.03	-1.35*	-3.25	0.74	2.06	6.95***
May	0.36	0.49	0.68	0.55	0.6	-0.53
June	0.48	0.88	-0.46	0.48	0.33	1.19
July	3.00***	7.00	0.73	3.08*	2.2	1.96
August	-1.64	-3.98	1.47	-3.18**	-1.46	-1.02
September	-2.32***	-3.54*	-0.16	-2.09	-3.74***	-2.04
October	0.06	-0.14	-2.08	-0.77	1.15	2.14***
November	-1.04*	-1.08	-0.98	-1.34	-3.98**	2.21*
December	-2.54***	-1.34	0.12	-1.37	-5.36**	-4.5*

To analyze the size effect for this sub-period, the following regression equation with dummies in post-tax period has been run:

$$R_{it} = \alpha_i + \beta_{i1}D_{2t} + \beta_{i2}D_{3t} + \beta_{i3}D_{4t} + \beta_{i4}D_{5t} + e_t$$

Where, R_t is the mean return of the stock portfolio on the month 't'. The variable did takes a value of one if the return occurs on 'i' portfolio on month 't' and zero if the return occurs on the portfolio other than 'i' (d_{2t} = portfolio 2, d_{3t} = portfolio 3, d_{4t} = portfolio 4, d_{5t} = portfolio 5). Further, 'α_i' measures the mean return for portfolio one for each month and coefficients β_1 through β_4 measure the difference between the mean return for each portfolio and the mean return for portfolio 1. 'e_t' is the random error term.

The regression model is tested for the null hypothesis:

Ho: $\beta1 = \beta2 = \beta3 = \beta4 = 0$ against the alternative hypothesis that mean return for each portfolio is not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the portfolios. Further, the significant F-value also led to the conclusion of size effect in the returns of calendar months in the year.

The Table 4.8 provides the regression coefficients and corresponding F-values for the different month-of-the-year along with different portfolios. The returns in two months, viz. April and November are observed significant in post-tax period. As explained, both the months are culturally important month in Nepal. However, the coefficients are significant in February, March, July, September, October and November. Thus, the results are also consistent with the pre-tax and overall period.

Table 4.8

Regression coefficients for the size-effect in calendar months in Nepalese stock market (post-2001)

This table provides the results of regression analysis for post-2001 period, dependent variable being return on each month of the year. Since portfolio one (PF1) is the reference portfolio, the intercept (α_i) measures the mean return for PF1, the coefficients β1 through β4 measures the difference between the mean return for other portfolios and mean return for PF1. The significance of the coefficients are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from each other. The R^2 and Adj R^2 values measure the goodness of fit of the fitted sample regression line. F-test measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Month	α_i	β_1	β_2	β_3	β_4	Adj R^2	F-Value	p-value
January	-2.23	-0.87	-1.15	0.70	0.47	-0.13	0.14	0.97
February	-2.99**	2.40	2.04	4.16**	-0.03	0.12	1.97	0.13
March	0.17	0.04	-0.88	-1.29	-6.04*	0.01	1.07	0.39
April	-1.35	-1.90	2.09	3.41	8.30***	0.34	4.77	0.01
May	0.49	0.19	0.06	0.11	-1.02	-0.15	0.07	0.99
June	0.88	-1.34	-0.40	-0.55	0.31	-0.11	0.26	0.90
July	7.00***	-6.27*	-3.92	-4.80	-5.04	0.02	1.12	0.37
August	-3.98	5.45	0.80	2.52	2.96	-0.10	0.34	0.85
September	-3.54***	3.38*	1.45	-0.20	1.50	0.06	1.46	0.25
October	-0.14	-1.94	-0.63	1.29*	2.28*	0.02	1.13	0.37

November	-1.08	0.10	-0.26	-2.90*	3.29	0.43	6.41	0.00
December	-1.34	1.22	-0.03	-4.02	-3.16	0.12	1.97	0.13

Thus, the results of portfolio analysis show that:

- January, February and September are the months of negative returns for all portfolios in overall period and sub-periods.
- July and October are the months of positive returns for all sizes of portfolios for overall as well as sub-periods.
- Size-effect has been observed on April, July and November. These three months are important from the cultural point of view in Nepal. In April, Nepalese calendar year begins, Fiscal year ends in July and the national festivals of Dashain and Tihar lies in November.
- It has been observed that, in July, small portfolio yields higher returns, where as in April and November, large portfolio yields higher returns. Thus, there is a small firm effect in July and large firm effect in April and November.
- No January effect has been observed in portfolio analysis for overall period and sub-periods.

4.5 Analysis of day-of-the-week effect

This section consists of the analysis and findings related to the day of the week effect in Nepalese stock market. The analysis has been made using the index return data and portfolio of stock constructed on the basis market capitalization.

Table 4.9
Mean day-of-the-week returns

The data for this table are from the Nepal Stock Exchange index files. Panel A of the table reports the mean, standard deviation, t-statistic of day-of-the-week returns for overall period. Panel B and panel C of the table report for sub-periods: pre-2001 and post-2001. Mean stands for average return for the respective day of the week. N stands for number of observations. SD stands for standard deviation and measures the volatility of the returns. The t-value represents whether the day of the week mean returns are significantly different from zero. The p-value is the lowest significance level at which a null hypothesis can be rejected. The null hypothesis is the mean returns for each weekday are not significantly different form zero.

Panel A: Average percent return from close to close for NEPSE index by day-of-the-week, 1996-2005

Day	N	Mean	SD	t- value	p-value
Sunday	195	0.08	0.72	1.49	0.14
Monday	469	0.01	1.15	0.25	0.80
Tuesday	471	0.04	1.00	0.86	0.39
Wednesday	480	-0.04	1.50	-0.64	0.52
Thursday	464	-0.05	0.94	-1.21	0.23
Friday	264	0.18	1.40	2.14	0.03

Panel B: Average percent return from close to close for NEPSE index by day-of-the-week (Pre-1999)

Day	N	Mean	SD	t- value	Probability
Sunday	182	0.07	0.74	1.35	0.18
Monday	187	-0.02	0.80	-0.31	0.75
Tuesday	190	0.04	0.72	0.72	0.47
Wednesday	194	0.03	0.78	0.50	0.62
Thursday	186	0.03	0.62	0.60	0.55
Friday	-	-	-	-	-

Panel C: Average percent return from close to close for NEPSE index by day-of-the-week (post-1999)

Day	N	Mean	SD	t- value	Probability
Sunday	-	-	-	-	-
Monday	282	-0.03	1.93	-0.25	0.80
Tuesday	280	0.14	1.82	1.30	0.19
Wednesday	287	-0.09	1.83	-0.84	0.41
Thursday	279	-0.04	1.60	-0.38	0.70
Friday	263	0.19	2.19	1.43	0.15

(a) Descriptive statistics

The results of day of the week effect in Nepalese stock market are presented in Table 4.9. Panel A of the table provides the daily mean return from NEPSE index along with their standard deviation, t-statistic and their probability values for overall period.

As the result indicates, Sunday (0.08 percent) and Monday (0.01 percent) returns are positive, where as Wednesday (-0.04 percent) and Thursday (-0.05 percent) returns are negative. The highest mean return has been observed on Friday (0.18 percent) and the lowest return has been observed on Thursday (-0.05 percent). The Wednesday returns are observed highly volatile with the standard deviations of 1.50 percent followed by Friday returns (Standard deviation 1.40 percent). Friday returns are also significant at 5 percent level indicating the Friday effect in Nepalese stock market.

Panel B and Panel C of the table provides the results for sub-periods: pre and post 1999. In pre-99 period, Sunday was the beginning day of the trading week and Thursday was the closing day. As against the findings of US studies, Sunday return (the first trading day of the week) is the highest return where as Monday return (the second trading day of the week) is lowest and negative. The Monday returns are highly volatile with standard deviation of 0.80 percent followed by Wednesday return (with standard deviation of 0.78 percent). The returns on all the weekdays are not significant for this sub-period.

Figure 4.4: Mean weekday returns (1996-2005)

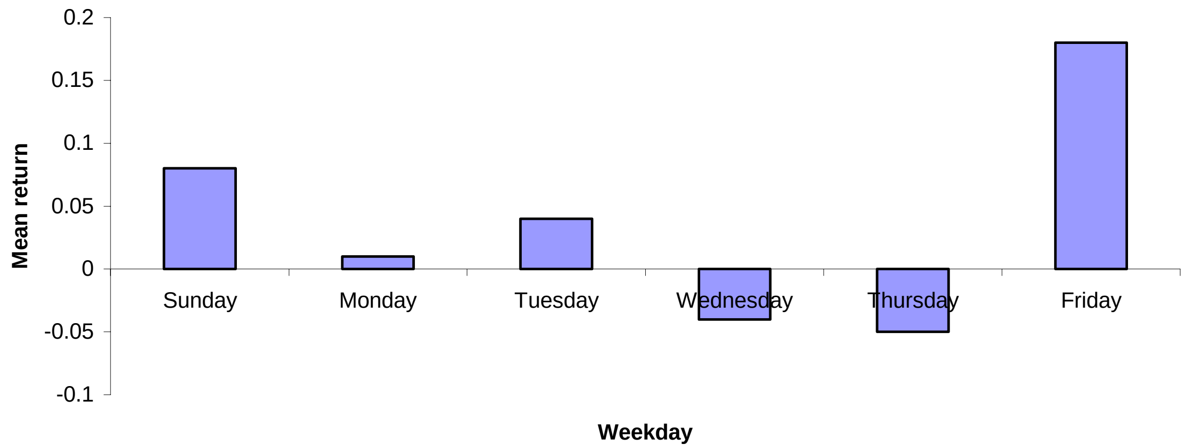
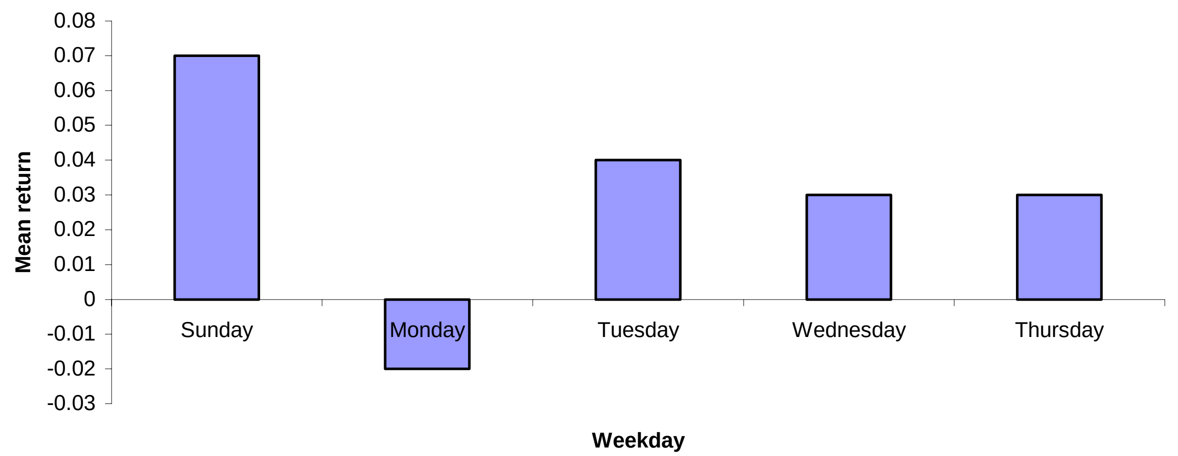
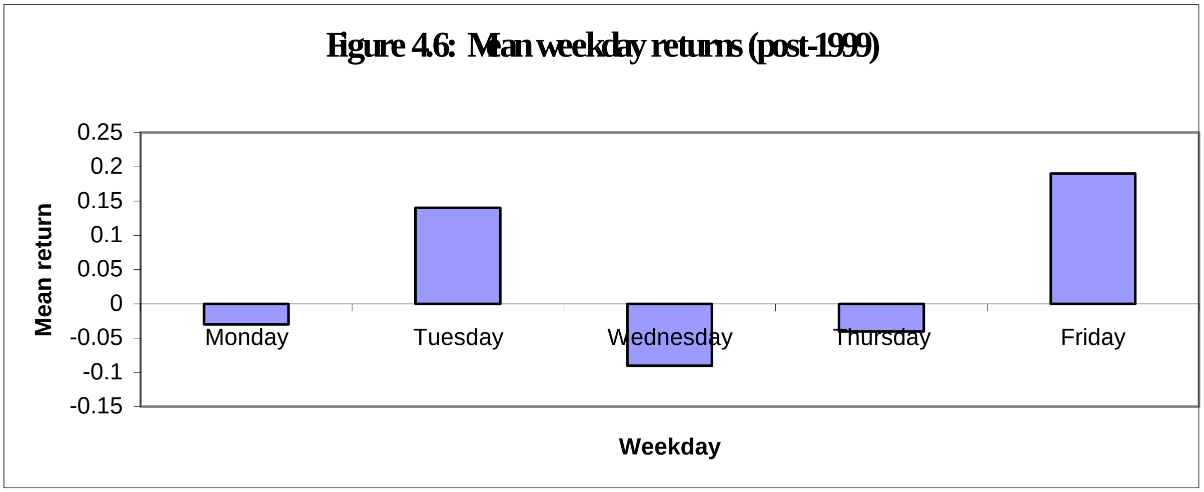


Figure 4.5: Mean weekday returns (pre-1999)





In post-99 period, the Monday (the first trading day of the week) return is negative along with Wednesday (the third trading day of the week). However, the Friday return is the highest positive one. Highly fluctuating returns are observed on Friday with the standard deviation of 2.19 percent followed by Monday returns (with standard deviation of 1.93 percent). Though insignificant, this trend of results seemed to be consistent with the results of earlier US studies.

The figures also exhibited that Tuesday returns are positive for all the periods. Wednesday and Thursday follow same patterns in overall period and sub-periods. Moreover, Friday returns are the highest among the other weekday returns.

(b) Regression analysis

The presence of the day of the week effect has been estimated by using the following Ordinary Least Square (OLS) equation with dummies.

$$R_{it} = \alpha_i + \beta_{i1} D_{2t} + \beta_{i2} D_{3t} + \beta_{i3} D_{4t} + \beta_{i4} D_{5t} + \mathrm{e}_t$$

Where, R_t is the mean return of the index on day 't'. The variable d_{it} takes a value of one if the return occurs on 'i' day and zero if the return occurs on the portfolio other than 'i' day. Thus, d_{2t} = Monday, d_{3t} = Tuesday, d_{4t} = Wednesday, d_{5t} = Thursday in pre-99 period. On the other hand, d_{2t} = Tuesday, d_{3t} = Wednesday,

d_{4t} = Thursday, d_{5t} = Friday in post-99 period. Further, 'α_i' measures the mean return for Sunday (pre-99) and Monday (post-99). The coefficients β_1 through β_4 measure the difference between the mean return for Sunday (For post-99, mean return for Monday) and the mean return for rest of the weekdays. 'e_t' is the random error term.

The regression model is tested for the null hypothesis:

Ho: $\beta1 = \beta2 = \beta3 = \beta4 = 0$ as against the alternative hypothesis that mean return for each days are not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the day of the week indicating the existence of day-of-the-week effect. Further the significant F-value also led to the conclusion of the day-of-the-week effect.

The Table 4.10 reports the regression results for the day of the week effect. The results for both the sub-periods do not support the null hypothesis. All the regression coefficients β_1 through β_4 representing the difference between Sunday (Monday for post-99) and other weekdays return are not significant and F-value for both the periods are also insignificant. Interestingly, the magnitude of the difference between Sunday and Monday return is highest in pre-99 period where as the magnitude of the Monday and Friday return is highest for post-99 period.

Table 4.10

Regression coefficients for the day-of-the-week effect in Nepalese stock market (NEPSE index return)

This table provides the results of regression analysis, dependent variable being return on market as measured by logarithmic change in NEPSE indexes for the pre-1999 and post-1999 period. Coeff. are the coefficients of intercept and weekday dummies. The associated t-value and p-values measures the significance of the coefficients. Since Sunday is the reference day for pre-1999 period and Monday is the reference day for post-1999, the intercept (α_i) measures the mean return for Sunday (pre-1999) and for Monday (post-1999), the coefficients $\beta1$ through $\beta4$ measures the difference between the mean return for each day of the week and mean return for Sunday (and Monday for post-1999). The Adj R^2 values measures the goodness of fit of the fitted sample regression line. F-value measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

	Pre-1999			Post-1999		
	Coeff.	**t-value**	**p-value**	**Coeff.**	**t-value**	**p-value**
α_i	0.07	1.36	0.17	-0.03	-0.25	0.80
β1	-0.09	-1.21	0.23	0.17	1.07	0.28
β2	-0.04	-0.48	0.63	-0.06	-0.40	0.69
β3	-0.05	-0.61	0.54	-0.01	-0.05	0.96
β4	-0.05	-0.61	0.54	0.22	1.37	0.17
Adj R^2		-0.003			0.001	
F-value	0.37		0.83	1.19		0.31

Thus, the results of the day of the week effect from NEPSE returns show that:

- There is no Sunday (or Monday) effect in Nepalese stock market.
- The Monday return is negative and Friday return is positive only for the post-99 period, which is consistent with the results of many US studies.
- No regression coefficients and F-values for pre-and-post-99 periods are significant thus confirming the non-existence of day of the week effect in Nepal.

(c) Portfolio analysis

To further the analysis of the calendar effects in Nepalese stock market, the size-effect on day-of-the-week has been discussed by constructing the five size-sorted portfolios. These portfolios are denoted by PF1, PF2 …..and PF5, where PF1 contains the lowest and PF5 contains the highest capitalized stocks.

The results of the portfolio returns for the overall period are presented in Table 4.11. The highest return is observed in Friday (0.55 percent) for PF2 followed by 0.42 percent (PF1) and 0.35 percent (PF4) both on Sundays. The highest negative return, on the other hand, has been observed in Friday (-0.31 percent) for PF4 followed by –0.26 percent on Monday for PF2 and -0.18 percent on Tuesday for PF4. Sunday return is positive for the entire portfolios except for PF2. Monday returns are negative for two portfolios, viz. PF2 and PF5. Friday returns are negative for two portfolios, PF3 and PF4. The significant returns are observed on Tuesday (PF3 and PF5), Wednesday (PF1), Thursday (PF1) and Friday (PF2).

Table 4.11
Average percent return from close to close for size-sorted portfolio by day-of-the-week, 1996-2005

This table reports the mean return of each day of the week for size-sorted portfolios for the period 1996 through 2005. The PF1, PF2, PF3, PF4 and PF5 are the mean returns for the portfolios of listed companies based upon their market capitalization, PF1 being the smallest portfolio and PF5 being the largest one. The significance of the mean return are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from zero.

Day	PF1	PF2	PF3	PF4	PF5
Sunday	0.42	-0.05	0.16	0.35	0.05
Monday	0.20	-0.26	0.04	0.05	-0.05
Tuesday	0.02	0.01	0.42**	-0.18	0.33*
Wednesday	0.29**	-0.01	-0.11	-0.09	0.03
Thursday	0.33*	0.23	-0.11	0.04	0.01
Friday	0.27	0.55*	-0.03	-0.31	0.04

To analyze the size effect on day-of-the-week, the following regression equation with dummies has been carried out:

$$R_{it} = \alpha_i + \beta_{i1} D_{2t} + \beta_{i2} D_{3t} + \beta_{i3} D_{4t} + \beta_{i4} D_{5t} + e_t$$

Where, R_t is the mean return of the stock portfolio on day 't'. The variable D_{it} takes a value of one if the return occurs on 'i' portfolio on day 't' and zero if the return occurs on the portfolio other than i (d_{2t} = portfolio 2, d_{3t} = portfolio 3, d_{4t} = portfolio 4, d_{5t} = portfolio 5). Further, α_i measures the mean return for portfolio one for each day and coefficients β_1 through β_4 measure the difference between the mean return for each portfolio and the mean return for portfolio 1. 'e_t' is the random error term.

The regression model is tested for the null hypothesis:

Ho: $\beta1 = \beta2 = \beta3 = \beta4 = 0$ against the alternative hypothesis that mean return for each portfolio is not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the portfolios. Further, the significant F-value also led to the conclusion of size effect in the returns of day-of the-week.

Table 4.12 reports the regression coefficients and associated F-value when size-dummies are used to analyze the day of the week effect. It is evidenced that Sunday returns for each portfolio are not significantly deviated from return on portfolio one. However, on Monday, return on portfolio two (PF2) is significantly lower than portfolio one. On the other hand, on Tuesday, return on portfolio three (PF3) is significantly higher than portfolio one. Moreover, the F-value is significant on Tuesday, thus, leading to the size effect on Tuesday. Besides this, no significant coefficients are observed within this period. Interestingly, F-value is significant on Friday.

The size effect is further analyzed for two sub-periods: pre and post 1999. The mean returns for each portfolio on each day for pre-99 period has been presented in Table 4.13. The highest return is observed on Thursday (0.93 percent) followed by 0.66 percent for PF3 and 0.59 percent for PF5 on Tuesday. Similarly, the lowest return is observed on Monday (-0.42 percent) for PF2 followed by –0.41 percent on Wednesday for PF2 and –0.18 percent on Tuesday for PF4. The significant returns are observed on Monday (PF2), Tuesday (PF1 and PF3), Wednesday (PF5) and Thursday (PF1 and PF5).

Table 4.12

Regression coefficients for the size-effect in day of the week in Nepalese stock market

This table provides the results of regression analysis, dependent variable being return on each day of the week for the period 1996 through 2005. Since portfolio one (PF1) is the reference portfolio, the intercept (α_i) measures the mean return for PF1, the coefficients β1 through β4 measures the difference between the mean return for other portfolios and mean return for PF1. The significance of the coefficients are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from each other. The Adj R^2 values measures the goodness of fit of the fitted sample regression line. F-value measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Day	αi	β1	β2	β3	β4	Adj R^2	F-Value	P-value
Sunday	0.42	-0.47	-0.26	-0.07	-0.37	-0.12	0.23	0.92
Monday	0.20	-0.46*	-0.16	-0.15	-0.25	0.01	1.01	0.39
Tuesday	0.07	-0.00	0.41**	-0.19	0.31	0.23	3.21	0.03
Wednesday	0.29	-0.30	-0.40	-0.38	-0.26	0.04	1.28	0.30
Thursday	0.33	-0.10	-0.44	-0.29	-0.31	0.01	1.05	0.40
Friday	0.27	0.28	-0.31	-0.58	-0.23	0.05	2.78	0.05

Table 4.13

Average percent return from close to close for size-sorted portfolio by day-of-the-week, Pre-99

This table reports the mean return of each day of the week for size-sorted portfolios for the period 1996 through 1999. The PF1, PF2, PF3, PF4 and PF5 are the mean returns for the portfolios of listed companies based upon their market capitalization, PF1 being the smallest portfolio and PF5 being the largest one. The significance of the mean return are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from zero.

Day	PF1	PF2	PF3	PF4	PF5
Sunday	0.33	-0.10	0.13	0.38	0.04

Monday	0.24	-0.42*	0.01	-0.00	-0.42
Tuesday	0.34***	0.00	0.66*	-0.18	0.59
Wednesday	0.29	-0.41	0.14	0.12	0.28*
Thursday	0.93**	0.25	-0.16	-0.08	0.25**

To analyze the size effect on day-of-the-week effect for pre-99 period the following regression equation with dummies is carried out:

$$R_{it} = \alpha_i + \beta_{i1}D_{2t} + \beta_{i2}D_{3t} + \beta_{i3}D_{4t} + \beta_{i4}D_{5t} + e_t$$

Where, R_t is the mean return of the stock portfolio on the day 't'. The variable D_{it} takes a value of one if the return occurs on 'i' portfolio on day 't' and zero if the return occurs on the portfolio other than i (d_{2t} = portfolio 2, d_{3t} = portfolio 3, d_{4t} = portfolio 4, d_{5t} = portfolio 5). Further, αi measures the mean return for portfolio one for each day and coefficients β_1 through β_4 measure the difference between the mean return for each portfolio and the mean return for portfolio 1. 'e_t' is the random error term.

The regression model is tested for the null hypothesis:

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ against the alternative hypothesis that mean return for each portfolio is not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the portfolios. Further, the significant F-value also led to the conclusion regarding the size effect in the returns of day-of-the-week.

The results of the regression coefficients are presented in Table 4.14. The results indicate that there is a size effect on Thursday in pre-99 period. The coefficients are significant as well as the F-value also significant on Thursday in this period. The significant and highest positive intercept value on Thursday indicates the small-firm effect.

Similarly, the average returns for different portfolios across the day of the week in post-99 period are presented in Table 4.15. The highest return has been observed on Friday (0.56 percent) for PF2 followed by 0.28 percent on Monday for PF1 and 0.27 percent on Friday for PF1. On the other hand, the highest negative return has been observed on Friday (-0.28 percent) for PF4 followed by -0.26 percent for PF1 and –0.24 percent for PF4 on Tuesday. The significant returns are observed on Monday (PF5) and Friday (PF2).

Table 4.14

Regression coefficients for the size-effect in day of the week in Nepalese stock market

This table provides the results of regression analysis, dependent variable being return on each day of the week for the period 1996 through 1999. Since portfolio one (PF1) is the reference portfolio, the intercept (α_i) measures the mean return for PF1, the coefficients β1 through β4 measures the difference between the mean return for other portfolios and mean return for PF1. The significance of the coefficients are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from each other. The Adj R^2 values measures the goodness of fit of the fitted sample regression line. F-value measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Day	αi	β1	β2	β3	β4	Adj R^2	F-Value	P-value
Sunday	0.33	-0.44	-0.21	0.05	-0.30	-0.13	0.17	0.95
Monday	0.24	-0.67	-0.24	-0.25	-0.66	0.01	1.11	0.37
Tuesday	0.34	-0.34	0.31	-0.52	0.25	0.08	1.64	0.20
Wednesday	0.29	-0.70	-0.15	-0.18	-0.01	-0.03	0.78	0.55
Thursday	0.93***	-0.69**	-1.09***	-1.01***	-0.68**	0.33	4.52	0.01

Table 4.15

Average percent return from close to close for size-sorted portfolio by day-of-the-week, Post-99

This table reports the mean return of each day of the week for size-sorted portfolios for the period 1999 through 2005. The PF1, PF2, PF3, PF4 and PF5 are the mean returns for the portfolios of listed companies based upon their market capitalization, PF1 being the smallest portfolio and PF5 being the largest one. The significance of the mean return are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from zero.

Day	PF1	PF2	PF3	PF4	PF5
Monday	0.28	-0.11	0.21	0.13	0.16**
Tuesday	-0.26	-0.09	0.24	-0.24	0.16
Wednesday	0.20	-0.01	-0.21	-0.01	-0.02
Thursday	-0.03	0.29	-0.10	0.23	-0.13

Friday	0.27	0.56**	-0.03	-0.28	0.04

To analyze the size effect on day-of-the-week for post-99 period the following regression equation with dummies is carried out:

$$R_{it} = \alpha_i + \beta_{i1} D_{2t} + \beta_{i2} D_{3t} + \beta_{i3} D_{4t} + \beta_{i4} D_{5t} + e_t$$

Where, R_t is the mean return of the stock portfolio on the day 't'. The variable D_{it} takes a value of one if the return occurs on 'i' portfolio on day 't' and zero if the return occurs on the portfolio other than i (d_{2t} = portfolio 2, d_{3t} = portfolio 3, d_{4t} = portfolio 4, d_{5t} = portfolio 5). Further, αi measures the mean return for portfolio one for each day and coefficients β_1 through β_4 measure the difference between the mean return for each portfolio and the mean return for portfolio 1. 'e_t' is the random error term.

The regression model is tested for the null hypothesis:

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ against the alternative hypothesis that mean return for each portfolio is not equal. The significance of coefficient of at least one dummy variable confirms that there is no equality of mean returns across the portfolios. Further, the significant F-value also led to the conclusion with respect to the size effect in the returns of day of the week.

The results of the regression are presented in Table 4.16. The results indicate the size effect on Friday in post-99 period. The regression coefficients and F-value both are significant on Friday. The highest and positive intercept value indicates the small-firm effect on this day. In other words, the smaller the size of the portfolio, the higher the return on Friday.

Table 4.16

Regression coefficients for the size-effect on day of the week in Nepalese stock market

This table provides the results of regression analysis, dependent variable being return on each day of the week for the period 1999 through 2005. Since portfolio one (PF1) is the reference portfolio, the intercept (α_i) measures the mean return for PF1, the coefficients β1 through β4 measures the difference between the mean return for other portfolios and mean return for PF1. The significance of the coefficients are denoted by the * sign. A single * means significant at 10 percent level, ** indicates significant at 5 percent level and *** represents significant at 1 percent level. The null hypothesis is the mean returns for each portfolio are not significantly different from each other. The Adj R^2 values measures the goodness of fit of the fitted sample regression line. F-value measures the impact of all explanatory variables on the dependent variable with the null of their impact being simultaneously equal to zero.

Day	αi	β1	β2	β3	β4	Adj R^2	F-Value	P-value
Monday	0.28	-0.40	-0.07	-0.16	-0.12	-0.05	0.67	0.62
Tuesday	-0.26	0.17	0.50	0.02	0.42	0.01	1.07	0.39
Wednesday	0.20	-0.21	-0.41	-0.21	-0.22	-0.07	0.53	0.71
Thursday	-0.03	0.33	-0.07	0.26	-0.10	-0.03	0.62	0.65
Friday	0.27	0.28	-0.31	-0.55**	-0.23	0.17	2.51	0.07

Thus, the overall analysis of the portfolio shows that:

- No clear size effect has been observed for overall period, however some indication is observed on Tuesday.
- In pre-99 period, the results show that small-firm (low market capitalization firm) yields higher return on Thursday (the last trading day of the week).
- In post-99 period, the small-firm effect is again pronounced on Friday (the last trading day of the week).

4.6 Discussion

This chapter examined the calendar anomaly using month-of-the-year and day-of-the week effect in Nepalese stock market for the period from 1996 to 2005 using close-to-close returns of NEPSE index. In addition, size effect on month of the year and day of the week has also been analyzed by constructing five size-sorted portfolios based on market capitalization of the listed companies in Nepal Stock Exchange. In both the cases, Ordinary Least Square (OLS) regression with month and days dummies as well as size dummies have been carried to identify the statistical significance of these variables.

As regards the month of the year effect, no clear evidence of such an effect has been observed in Nepalese stock market. However, there appears higher and positive return, though not significant, in the month of October. This result is not consistent with the findings of the many US studies those supported the January effect. The higher positive return in the month of October might be justified possibly in the cultural grounds. Nepal celebrates her great national festivals 'Dashain' and 'Tihar' in the months October and November.

More precise results from size sorted portfolios evidenced July and October as the month of positive returns where as January, February and September are the months of negative returns. The size effect has observed on April, July and November. In July, small-firms yield higher returns, where as in April and November, large firms’ portfolio yields higher returns. Interestingly, both April and July are the beginning month of Calendar and Fiscal year in Nepal.

In the day of the week front, no Sunday or Monday effect has been observed in Nepalese stock market. However, Friday return was highest and positive in overall period and post-99 period. The negative return on Wednesday (overall period and post-99 period) and Thursday (overall period and post-99 period) has been observed for which no explanation can be attributed. This result, however, do not clearly support the existence of market efficiency in Nepalese stock market.

As regards portfolio analysis to analyze the size effect on day of the week, the results shows that in pre-99 era, large portfolio yield higher return on Thursday where as in post –99 period, the same effect has been observed on Friday. Both Thursday and Friday are the weekend days in the respective periods.

Thus, the existence of calendar or time anomalies denies efficient market hypothesis (EMH), which states there is no identifiable short-term time based pattern on stock returns by utilizing past information. Though the NEPSE index return shows no evidence of such an anomalous results in Nepalese stock market, the portfolio analysis does not support the index returns. Thus, the presence of size anomaly on both- the month of the year and day of the week- still does not support the efficiency of Nepalese stock market even in weak form. The results further support the findings of the random walk hypothesis.

In the next chapter, the microstructure of the Nepalese stock market will be further analyzed using primary data. The opinions of executives of listed companies and investors will be examined to further the understanding of the efficiency of stock market in Nepal.

Chapter V
EVALUATION OF MARKET EFFICIENCY IN NEPAL

5.1 Background

Efficient market hypothesis (EMH) in the context of Nepal has been extensively tested using secondary data in weak form and semi-strong form. Both the tests failed to recognize the EMH in Nepalese stock market. However, some anomalous behavior of stock prices indicates inherent inefficiency, particularly calendar effects detect possibilities in forming investment strategies based on historical price data. The efficiency of the market, as explained earlier, is the inclusion of all available information in stock prices so that investors do not require to make any strategy to beat the market. For this purpose, the regulators and supervisors in the capital market should ensure that all the relevant price-sensitive information be disseminated instantaneously. Institutional and legal provisions, on the one hand, and investors' awareness, on the other, are, thus, important to make market more efficient, transparent and informative.

As such, this study further explored market efficiency by conducting an opinion survey targeted to the key players in the stock market in Nepal. The major components in the stock market are investors and listed companies. Both the investors and institutions play a key role in formulating stock prices, among others. Listed companies affect stock prices by making decisions on sales, marketing, management, capital budgeting, dividends, mergers and acquisitions, public issue of various types of securities. These companies also release price-sensitive information regarding their operations, management, incomes and future prospects. Periodical announcement of earnings and dividends, management decision to split the stocks, repurchase of stock and issue of rights to restructure the capital are also price-sensitive information. Investors develop strategies of their investment on the basis of such information released by the listed companies.

Similarly, individual investors play an important role in stock market functioning. Stock market is predominantly affected by the behavior of the investors and their perception of information. Market behaves in accordance with the expectation of the investors. Corporate decisions, economic events, political and global imbalances, natural calamities etc. help to build the expectation regarding future stock prices.

A few studies have been conducted to examine the behavior of investors and executives of listed companies. In particular, surveys have occasionally been used by academic researchers in financial economics to study investors' behavior, their opinion and decision-making skill. Lewellen *et al*. (1977) for example, analyzed 972 questionnaire sent to clients of a large brokerage firm to query them about their investment goals, behavior and beliefs – including their opinion on the predictability of stock returns. Baker *et al*. (1977) and Gooding (1975) likewise used mail questionnaire to survey investors' attitude towards risk and their perceptions of common stocks as investments. Shiller (1990) sent survey questionnaire to investors to collect information about their views on the prospects of the stock market. Shiller (1997) used a mailed questionnaire to poll people about their understanding of inflation. Welch (2000 & 2001) used email questionnaire to poll financial economists on their beliefs about the stock market before and after the crash – including their opinion on the efficiency of public securities' market prices. Benartzi and Thaler (2001) polled investors by e-mail about their holdings in various asset classes and their investment strategies. The Yale School of Management Investor Confidence indices show that 70% of market participants considered the market to be overvalued in early 2000, while 70% of respondents also believed the market would continue to advance.

One study to focus explicitly on the psychology of bubble investors is Vissing-Jorgensen's (2003) analysis of the UBS/Gallup index of investor optimism. The study uses survey data regarding investors' beliefs and behavior around the crash. The study includes demographic data, information about investors' experience and information about Internet stock holdings. Among other things, the study finds evidence consistent with a behavioral bubble -- investors believed the market was over-valued but still expected it to have a high return. The study is also able to document direct behavioral evidence consistent with self-attribution bias. Finally, it is able to link beliefs to investors' choice.

Though most of the studies on EMH are found to be based only on secondary data, it is also imperative to survey opinion of individual investors and executives of listed companies to highlight the other aspects of EMH not covered by the previous chapters. As mentioned earlier, both the investors and companies play a major role in shaping the price of the stocks and their opinion on various efficiency-measuring variables is instrument to further development of overall capital market.

This chapter, therefore, evaluates some aspects of the Nepalese stock market so as to shed light on market efficiency based on survey of the investors and executives of listed companies. The remainder of the chapter is divided into four sections: section 5.2 describes the data and survey model. The results from the survey of individual investors are analyzed and presented in section 5.3. Section 5.4 provides the analysis and findings of listed companies' executives. Finally, a discussion over the results of the survey in section 5.5 concludes the chapter.

5.2 Survey procedures

(a) The data and sampling design

This study has examined the efficiency of Nepalese stock market by conducting a survey on opinion of investors and executives of listed companies. For the purpose of the study, 350 questionnaire was distributed from December 2006 to April 2007 to individual investors, located in Kathmandu valley. The investors were selected on the basis of systematic sampling. Collection of the view of investors who actively participated in the buying and selling of shares in secondary market was focused**.** Thus, three main places were identified to select the investors. Firstly, 150 questionnaire was distributed to the investors who visited Nepal Stock Exchange office. Secondly, 100 questionnaire was distributed to the investors who visited brokers' office to order shares. Finally, 100 questionnaire was also distributed to the investors who visited investment bankers' office. Three days, with five hours per day, were spent in NEPSE and 20 days with five hours per day were spent in brokers' and investment bankers' office. In NEPSE, individual investor who visited at every interval of five minutes has been taken as sample. Similarly, the same process has been adopted in the office of investment bankers and brokers. Proper care has been taken not to duplicate the sample. The survey generated a response rate of 44.57 percent (156 completed questionnaire was collected).

Regarding listed companies, questionnaire was distributed to 125 chief executives of the companies as listed in Nepal Stock Exchange till 2005. Knowledgeable individuals with broad understanding of the stock market behavior were supposed to complete the questionnaire to obtain an accurate view of the dynamics of market efficiency. While the questionnaire was distributed to the individuals identified as the chief executive officers (CEOs), the questionnaire was generally completed by an officer with more direct operational involvement in the financial management function and stock market-related issues such as company secretary, assistant general manager or financial manager. These individuals are generally more involved in day-to-day finance activities and, thus, are probably the most appropriate ones to complete the survey. The survey generated the response rate of 66.40 percent (83 useful questionnaire returned for the analysis).

(b) The questionnaire

Two different structures of questionnaire were designed to gather information on how investors and the listed companies viewed the different aspects of market efficiency in Nepalese stock market. The questionnaire for individual investor focused on identifying the investors' priorities on investment opportunities, their motivation on share investment, and their frequency of buying and selling. Some questions were designed to identify the level of awareness of the investors such as where they consult before buying or selling shares in secondary market, what do they consult before they order to buy or sell the shares, whether they manage or revise the portfolio and consider risk. Questions were also asked to identify the investors' reaction over different types of information such as announcement of dividends, bonus share, right share issues, public issues of new shares and so on. The survey also collected information about payment system in share transaction, brokers' efficiency in executing orders, efficiency of listed companies in processing stock certificates, reasons for dealing with more than one brokers and so on.

Similarly, the questionnaire, designed for listed companies, aimed at collecting information regarding major reasons, advantages and disadvantages of listing shares in stock exchanges along with any revision perceived in existing listing requirements. Some questions were also asked to gather information on how listed companies planned to determine the number of shares to be issued, the subscription status and associated floatation costs. The major questions to assess the efficiency of stock market in Nepal include the listed companies' ratings to regulatory bodies, time spent by the companies for transferring shares, the choice of media for dissemination of corporate news and financials for general public, time taken for dissemination of price-sensitive information, effectiveness of regulatory and supervisory bodies in inspection and supervision and penalty for any non-compliance. Some questions tried to collect the opinion of executives of the listed companies regarding intrinsic value of their shares.

5.3 Survey results of investors

This section analyses the responses, obtained from the investors. First, profiles of the respondents are described with important demographic parameters. The analysis also consists of evaluation of investment priority, motivating factors in share investment, choice of market and consulting place to make transactions by investors. Second, the status of efficiency in order management has been evaluated. Third, investors' reaction over the different types of events and news are analyzed. The sources of investment risk and risk management techniques are also examined. Finally, efficiency in stock transactions and awareness of investors about their rights has been investigated in this chapter.

(a) The respondents

The demographic backgrounds of the respondents in five parameters are presented in Table 5.1 to understand the investors profile i.e. age, education, gender, occupation, location (address).

It is observed from the table that majority of the persons responding to the survey (78.2 percent) belong to Kathmandu. The remaining respondents represent from Lalitpur (14.1 percent) and Bhaktapur (7.7 percent). The basic reasons behind this selection are:

- The share market activities of the country are mainly centered in the capital,
- Most of the listed companies have their head offices in Kathmandu,
- Nation’s only stock exchange, i.e. Nepal Stock Exchange Limited exists in Kathmandu,
- All the stockbrokers are centered in Kathmandu.

Table 5.1

Respondents' profile

Parameters		No. of respondents	Percentage
Location	Bhaktapur	12	7.7
	Kathmandu	122	78.2
	Lalitpur	22	14.1
	Total	**156**	**100.0**
Occupation	Practitioners	133	85.26
	Academicians	23	14.74
	Total	**156**	**100**
Gender	Male	136	87.2
	Female	20	12.8
	Total	**156**	**100.0**
Education	Upto graduate	77	49.36
	Post graduate	79	50.64
	Total	**156**	**100.0**
Age	Below 26 years	13	8.3
	27-34 years	52	33.3
	35-43 years	69	44.2
	44-51years	14	9.0
	52 years and above	8	5.1
	Total	**156**	**100.0**

The investment habit is guided by occupation of the investors. Occupation-wise analysis revealed that practitioners such as businessmen, service-holders and bankers (85.26 percent) dominate the academicians (teachers and students).

Similarly post-graduate and professionally educated respondents dominate the sample (50.64 percent).

As it is evident from the table, a majority of respondents are male (87.2 percent) and females consist of only 12.8 percent. Interestingly, it is further observed that young and adult investors (below the age of 43) constitute the majority of sample (85.8 percent). The proportion of senior citizens is the lowest (14.1 percent). This behavior corroborates the general trend in the industry.

(b) Evaluation of investment priority, motivation, choice of market and consulting place

There are several investment alternatives available for the investors in the form of both financial and real assets. The financial assets consist of shares, bonds, bank deposits, and government securities etc. whereas real estates, gold and silver, etc. are real assets.

When asked respondents to rank the relative priority on six investment alternatives on a scale of 1 (most preferred) to 7 (least preferred), investment on shares appeared to be the most prioritized alternative followed by real estate, bank deposits and government securities (Table 5.2). On another extreme, the lowest priority was assigned to bonds investment (the less risky financial asset than shares).

Table 5.2
Means and ranks of responses on the priority of investment

This table shows the weighted average responses (mean) obtained by asking the survey question ***"How do you prioritize the following investment opportunities?"*** *Categories of investors by occupation as well as qualification are presented in rows and investment opportunities are presented in columns. The ranks (1 = most prioritized and 7 = least prioritized) of priority for each category of investors are shown in parentheses.*

Categories / Opportunities			Shares	Real estate	Bank deposits	Govt. securities	Gold and silver	Bonds	Others
Occupation	Practitioners	Mean	2.36	2.97	3.30	3.44	3.88	4.38	6.50
		Rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Academicians	Mean	2.00	3.55	3.62	3.84	3.38	4.68	5.88
		Rank	(1)	(3)	(4)	(5)	(2)	(6)	(7)
	Overall	Mean	2.30	3.06	3.35	3.50	3.80	4.43	6.41
		Rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	F-value		1.08	1.48	0.56	1.06	2.18	0.77	1.15
Qualification	Up to graduate	Mean	2.33	3.25	3.24	3.12	3.77	4.38	6.55
		Rank	(1)	(4)	(3)	(2)	(5)	(6)	(7)
	Post graduate	Mean	2.28	2.92	3.45	3.80	3.82	4.46	6.22
		Rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Overall	Mean	2.30	3.06	3.35	3.50	3.80	4.43	6.41
		Rank	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	F-value		0.05	0.04	0.49	6.15*	0.04	0.11	0.62

** Significant at 5 percent* *** significant at 10 percent*

The priorities, assigned to bond and government securities, are consistent with the trading behavior of these securities in secondary market. As explained in Appendix-1, these securities have very little share in trading in Nepal Stock Exchange Limited.

Table 5.2 further states that there is uniformity in overall ranking and ranks given by practitioners to each investment alternatives. The F-values, which are not significant, indicates that practitioners and academicians do not differ in assigning ranks to investment alternatives. However, two qualification groups (up to graduate and postgraduate) differ significantly in assigning ranks to government securities as is evidenced by the significant F-value.

Regarding the choice of market, a majority of investors (63.9 percent) bought shares from primary market. The investors who normally bought shares from secondary market are only 36.1 percent. Lack of attraction in secondary market transactions indicates that Nepalese stock market does not support the normal behavior of EMH.

Table 5.3 provides the result of motivating factors to investors. There are many factors that motivate the investors to buy or sell securities in the market. These factors may vary from self-motivation to attraction of profitability and growth of the companies. Investors might be motivated by securities' businesspersons or by friends, neighbors or relatives. A majority of the investors (45.2 percent) responded that they are self-motivated followed by the respondents, who are motivated by company's growth and profitability (33.5 percent). However, there are some respondents who were motivated by friends (14.2 percent), brokers (4.5 percent) and neighbors (1.3 percent).

Table 5.3 further exhibits that within the occupation group, a majority of the practitioners are motivated by brokers (92.0 percent), friend's advice (90.9 percent) and attraction of profitability (90.4 percent). However, there is not significant association between the motivation factor and the occupation of the respondents (chi-square value of 7.62 is not significant). On the other hand, it is clear from the table that a majority of the less educated (up to graduate) respondents are motivated by friend's advice (68.2 percent). A majority of highly-educated respondents, however, are self-motivated (60 percent). The chi-square value (6.53) further suggests that there is not an association between the qualification of respondents and their motivation towards investment.

Table 5.3
Motivating factors to investors

This table provides the percentage of responses obtained by asking the survey question ***"What was your motivation to purchase the shares initially?"*** *Categories of investors by occupation as well as qualification are presented in column and motivating factors are presented in row.*

Motivating factors	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Self-Motivation	78.6	21.4	45.2	40.0	60.0	45.2
Friends' Advice	90.9	9.1	14.2	68.2	31.8	14.2
Broker's Advice	92.0	8.0	4.5	42.9	57.1	4.5
Neighbors'/Relatives' Suggestions	50.0	50.0	1.3	50.0	50.0	1.3
Attraction of Profitability	90.4	9.6	33.5	55.8	44.2	33.5
Others	88.0	12.0	1.3	50.0	50.0	1.3

As exhibited in Table 5.4, there are very few respondents who trade daily, weekly or fortnightly (cumulatively about 15 percent) in secondary market. This shows the lack of depth in Nepalese stock market. This also indicates that investors in Nepal hold either the shares for a long time (adopt--buy and hold strategy) or it is not easy to find the seller or buyer to execute the order. A majority of the investors within the occupation and education, however, responded that they do not have any identified frequency of trading. Further, there is not an association between the frequency of trading and occupation (and qualification) of the respondents as the chi-square values are not significant at 5 percent level of significance.

In an efficient market, it is assumed that investors are rational and well-informed. They make investment decisions based on the publicly available information. Table 5.5 reports the responses regarding the consultation place before making a decision to buy or sell. A majority of the respondents (55 percent) opined that they do not consult broker's office to execute their trading. It further indicates that the majority of respondents are still not aware of the consulting place before placing orders to make investment in shares. There is a chunk of respondents who does not consult at all before making investment decision (20.3 percent) and consult friends and relatives (17.6 percent). As the table reports, the chi-square values are not significant at 5 percent level of significance. It indicates that there is not an association between the occupation (and qualification) of investor and their consulting place before making an investment decision.

Table 5.4
Frequency of trading in secondary markets by investors

This table provides the percentage of responses obtained by asking the survey question, **"How frequently do you buy or sell shares in secondary market?"** *Categories of investors by occupation as well as qualification are presented in columns and frequencies of trading are presented in rows.*

Frequencies	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Daily	89.1	11.9	0.7	92.5	7.5	0.7
Weekly	91.7	8.3	8.2	58.3	41.7	8.2
Fortnightly	88.9	11.1	6.1	22.2	77.8	6.1
Monthly	88.5	11.5	17.7	42.3	57.7	17.7
Yearly	81.6	18.4	25.9	39.5	60.5	25.9
Once in 2 years	90.0	10.0	6.8	70.0	30.0	6.8
Once in 3 years	75.0	25.0	5.4	50.0	50.0	5.4
Others	86.0	14.0	29.3	60.5	39.5	29.3

Table 5.5
Consulting place by respondents before buying or selling shares in secondary market

This table provides the percentage of responses obtained by asking the survey question, ***"Where do you go to consult before you buy or sell the shares in secondary market?"*** *Categories of investors by occupation and qualification are presented in columns and consulting places in rows.*

Consulting places	**Occupation**			**Qualification**		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Broker Office	89.6	10.4	45.3	53.7	46.3	45.3
Company Office	85.7	14.3	4.7	42.9	57.1	4.7
Stock Exchange Office	78.6	21.4	9.5	50.0	50.0	9.5
Security Board Office	88.2	11.8	1.4	94.5	5.5	1.4
Buyer's/Seller's home	90.9	9.1	1.4	93.7	6.3	1.4
Friends/Relatives	88.5	11.5	17.6	46.2	53.8	17.6
No consultancy at all	83.3	16.7	20.3	43.3	56.7	20.3

The evaluation of the investment priority, motivating factor, choice of market and consulting place before making investment decision reveals that:

- Investors do prefer in share investment. However, they are reluctant in investment on bonds and government securities. This indicates either the lack of different kind of institutional, legal and regulatory infrastructure or inherent risk in the assets to make such assets popular among investors.

- The two important factors which drive the respondents towards share investment are identified as self-motivation and attraction towards the company's profitability. It is apparent in EMH that significant numbers of investors are motivated to invest in shares by the attraction of profitability of the company.

- Most of the respondents owned the shares buying from primary market. This indicates that secondary market trading, especially buying shares, is still not popular among the investors.

- More than 50 percent respondents do not consult the brokers for buying or selling securities in secondary market. It provides an insight into the lack of awareness and thus inefficiency in Nepalese stock market.

(c) Efficiency in order management

Buying and selling shares in stock market starts with making orders to the brokers. In an efficient market, it is expected that orders be processed quickly, executed and settled promptly. This also indicates the efficiency of brokers and overall stock market.

Before buying or selling shares in secondary market, investors should fill up the order form and instruct the brokers to execute the order forms. The orders might have different category as regards to the specification of the price. As explained in the Appendix-1, Nepal Stock Exchange has recently automated its transaction through wide area network (WAN) and provided the opportunity to specify prices in three forms, viz. (a) fixed price, (b) limit price and (c) market price. Table 5.6 provides responses regarding the type of orders the respondents make with brokers. A majority of the respondents (42.3 percent) preferred to make buying or selling orders in prevailing market price (market orders) followed by a limit order (30.2 percent). It has been observed from the table that among the respondents who specify limit price in order form are highly-qualified (postgraduate) investors. On the other hand, practitioners dominate academicians in specifying all types of prices in order form. The chi-square values, which are not significant, indicate that there is not an association between the occupation (and qualification) of respondents and their choice of making buy or sell order.

Table 5.6

Instruction to brokers for buying or selling shares in secondary market

This table provides the percentage of responses obtained by asking the survey question, ***"How do you instruct to buy or sell shares to your broker?"*** *Categories of investors by occupation and qualification are presented in columns and Instructions to brokers are presented in rows of both panels.*

Instructions	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Buy or sell in prevailing market price	88.9	11.1	42.3	55.6	44.4	42.3
Buy or sell within a limit of price	86.7	13.3	30.2	35.6	64.4	30.2
Buy or sell only at specified price	80.0	20.0	23.5	54.3	45.7	23.5
Others	83.3	16.7	4.0	66.7	33.3	4.0

There are different practices in stock market to retain the orders once they are filled-up by investors. The orders might be day orders that are to be executed within a day or these are cancelled. The orders might be retained until they are cancelled (good-till-cancelled, GTC). As explained in Appendix-1, Nepal Stock Exchange has a provision of end of day (EOD) and good-till-cancelled (GTC) order forms. The orders, which do not specify any time limit, are retained within 15 days. Regarding the practice of setting a time limit in order form, a majority of respondents (35.3 percent) specify a maximum of a week for order validity (Table 5.7). Very few investors (19.9 percent) make a day order. This tendency has been observed within the occupation and qualification group of respondents. The chi-square values, which are not significant, indicate that there is not an association between the occupation (and qualification) and normal practice of setting a time limit by investors.

Table 5.7
Normal practice of setting a time limit in order form by investors

This table provides the percentage of responses obtained by asking the survey question, "*What is your normal practice of setting a time limit?****" Categories of investors by occupation as well as qualification are presented in columns and time limits are presented in rows of both panels.***

Time limit	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
A day	88.9	11.1	19.9	55.6	44.4	19.9
A week	81.3	18.7	35.3	50.0	50.0	35.3
A month	87.5	12.5	11.8	37.5	62.5	11.8
Open date	75.0	25.0	11.8	62.5	37.5	11.8
Discretion of broker	95.0	5.0	14.7	50.0	50.0	14.7
Others	88.9	11.1	6.6	55.6	44.4	6.6

Tables 5.8 and 5.9 exhibit the responses of two questions on order management. The international practice of recognizing investors as round-lotter or odd-lotter is whether they buy or sell more than or less than 100 shares. In an efficient market, the overwhelming presence of round-lotters is expected to make market more competitive and facilitative for price discovery.

Table 5.8
Number of shares buying at a time in primary market by investors

*This table provides the percentage of responses obtained by asking the survey question, "***How many shares, normally, do you buy at a time in primary market?***" Categories of investors by occupation as well as qualification are presented in columns and numbers of shares buying at a time in primary market are presented in rows.*

No of share buying at a time in primary mkt.	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Less than 10 shares	92.2	7.8	1.9	33.3	66.7	1.9
10 - 20 shares	66.7	33.3	5.8	66.7	33.3	5.8

20 - 30 shares	50.0	50.0	3.9	94.5	5.5	3.9
30 - 50 shares	85.7	14.3	4.5	57.1	42.9	4.5
50 - 100 shares	88.0	12.0	32.5	46.0	54.0	32.5
100 - 500 shares	87.3	12.7	51.3	45.6	54.4	51.3
Above 500 shares						

Table 5.9

Number of shares buying at a time in secondary market by investors

*This table provides the percentage of responses obtained by asking the survey question, **"How many shares, normally, do you buy at a time in secondary market?"** Categories of investors by occupation as well as qualification are presented in columns and numbers of shares buying at a time in secondary market are presented in rows.*

No of share buying at a time in secondary mkt.	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Less than 100 shares	80.4	19.6	40.9	51.8	48.2	40.9
100 and multiples of 100 shares	87.1	12.9	22.6	48.4	51.6	22.6
More than 100 shares (not multiple of 100)	94.3	5.7	25.5	51.4	48.6	25.5
Others	90.0	10.0	10.9	53.3	46.7	10.9

The results of the tables show that a majority of the investors buy more than 100 shares in primary market (51.3 percent) and less than 100 shares in secondary market (40.9 percent). This indicates that a majority of the investors are round-lotter in primary market and odd-lotter in secondary market. The chi-square values which are not significant further indicates that there is not an association between the occupation (and qualification) of respondents and number of shares buying and selling in primary and secondary market.

(d) Reaction over the news/events

In an efficient market, it is expected that investors do react quickly and appropriately (neither over nor under reaction) over the different kinds of news and events. Accordingly, prices of the shares adjust immediately after the news becomes public. Table 5.10 provides the reaction of the respondents over the different possible events as regards to their investment decision.

Nine possible events were provided for reaction in terms of buying, selling or not trading the shares. A majority of the respondents preferred buying shares in case of likely events of announcements of cash dividends (60.4 percent), bonus shares (82.1 percent), right shares issue (74.3 percent) and public issue of new shares (55.5 percent). On the other hand, a majority of respondents preferred selling shares in the likely events of declines in profits as shown by quarterly financial report of the company (68.1 percent), member of the board of directors or company itself is blacklisted (83.8 percent). Interestingly, none of the respondents preferred to buy the stock in case of company or board members become blacklisted. A majority of the investors denied to trade if the company launches new products in the market (58.2 percent) and central bank increases the key policy interest rate i.e. discount rate or refinance rate (65.7 percent).

Table 5.10
Reaction over the news

This table provides the percentage of responses, obtained by asking the reaction of respondents in terms of buying or selling shares in the different events which are presented in the first column. Reactions over events are shown in the second column.

Events		Occupation				Qualification			
	Reaction	Practitioners	Academicians	Overall	χ^2	Up to graduate	Post graduate	Overall	χ^2
Co. is likely to announce cash dividend	Buy	81.6	18.4	60.4		43.7	56.3	60.4	
	Sell	92.9	7.1	9.7	1.81	50.0	50.0	9.7	2.42
	Do not trade	88.4	11.6	29.9		58.1	41.9	29.9	
Co. is likely to announce bonus shares	Buy	83.2	16.8	82.1		43.7	56.3	82.1	
	Sell	50.0	50.0	1.4	2.84	9.9	90.1	1.4	7.73*
	Do not trade	91.7	8.3	16.6		70.8	29.2	16.6	
Co. is likely to announce right share issue	Buy	85.0	15.0	74.3		43.9	56.1	74.3	
	Sell	77.8	22.2	6.3	0.36	66.7	33.3	6.3	2.90
	Do not trade	85.7	14.3	19.4		57.1	42.9	19.4	
Co. is likely to announce public issue of new shares	Buy	86.8	13.2	55.5		50.0	50.0	55.5	
	Sell	78.1	21.9	23.4	1.31	40.6	59.4	23.4	0.97
	Do not trade	82.8	17.2	21.2		51.7	48.3	21.2	
Quarterly report shows decline in profits.	Buy	66.7	33.3	4.2		83.3	16.7	4.2	
	Sell	84.7	15.3	68.1	1.75	44.9	55.1	68.1	3.44
	Do not trade	87.5	12.5	27.8		50.0	50.0	27.8	
Co. or B.M. are black listed by CIB	Sell	83.2	16.8	83.8	1.81	44.5	55.5	83.8	2.06
	Do not trade	95.7	4.3	16.2		60.9	39.1	16.2	
Co. launches new product in market	Buy	77.8	22.2	44.7		52.4	47.6	44.7	
	Sell	88.9	11.1	6.4	3.79	55.6	44.4	6.4	1.25
	Do not trade	89.9	10.1	48.9		43.5	56.5	48.9	
Co. issues bond in the market	Buy	81.3	18.7	22.7		53.1	46.9	22.7	0.76
	Sell	77.8	22.2	19.1	1.86	51.9	48.1	19.1	

	Do not trade	87.8	12.2	58.2		45.1	54.9	58.2	
NRB increase the discount rate.	Buy	71.4	28.6	15.3		66.7	33.3	15.3	
	Sell	76.9	23.1	19.0	5.02	38.5	61.5	19.0	3.75
	Do not trade	88.9	11.1	65.7		48.9	51.1	65.7	

** Significant at 5 percent* *** significant at 10 percent*

Co.: Company, B.M.: Board Member, CIB: Credit Information Bureau, NRB: Nepal Rastra Bank

The corresponding chi-square values which are not significant except in one event, i.e. announcement of bonus shares indicates that there is not an association between the reaction over the events by respondents and their occupation. The significant chi-square values in the aforementioned event imply that there is an association between the occupation of respondents and their reaction over those possible events.

(e) Sources of investment risk and risk management techniques

Investment risk is a function of business risk, financial risk, liquidity risk, default risk, purchasing power risk, bull-and-bear risk, political risk, management risk and so on. Depending upon the level of efficiency in the market, investors have avenues to identify, understand, predict and measure these sources of risk. The more efficient the market is, the more predictable and manageable the risk inherent in the investment. In this respect, the respondents were asked to rank the different sources of investment risk inherent in the share investment in Nepal. Table 5.11 exhibits fluctuation in market prices of the shares where bull-and-bear risk is the most prominent source of investment risk, as considered by the respondents of both the occupation and qualification groups. However, academicians feel that earning fluctuations (business risk) generate more risk than market price fluctuations. Interestingly, borrowing by the companies (financial risk) has been considered the least important source of investment risk by the respondents.

The F-values are observed in two sources, e.g. fluctuation in market price of shares and study of company's borrowings, which indicate that there is a difference in the rankings by respondents and their occupation. Similarly the significant F-values are also observed in two sources e.g. the study of earnings of the company (business risk) and fluctuation in market prices of the shares (bull-and-bear risk) further indicate that there is a difference in rankings by respondents and their qualification.

Investment in financial assets, especially in shares, is a risky phenomenon. In an efficient market, investors are aware about the risk, inherent in the share investment and make appropriate arrangements to minimize the risk. Portfolio management has been considered as a widely accepted technique for risk diversification. Among the diversification techniques, simple diversification (managing portfolio by investing in shares of different companies), diversification across industries (investing in the shares of different industries), mixed diversification (investing in the shares, bonds and other assets portfolio) and Markowitz diversification (investment in tangent portfolio in efficient frontier by risk-return indifference curve) are predominant techniques.

Table 5.11

Means and ranks of responses of the sources of investment risk

This table shows the weighted average responses (mean) obtained by asking the survey question, **"How do you consider the risk while investing in shares?"** *Categories of investors by occupation and qualification are presented in rows and sources of investment risks are presented in columns. The ranks (1 = highest degree of risk and 7 = lowest degree of risk) of sources of risk are shown in parentheses.*

Categories	Investment risk		A	B	C	D	E	F
Occupation	Practitioners	Mean	1.64	2.56	2.54	3.76	3.89	5.59
		Rank	(1)	(3)	(2)	(4)	(5)	(6)
	Academicians	Mean	2.37	2.32	3.38	3.44	3.31	5.38
		Rank	(2)	(1)	(4)	(5)	(3)	(6)
	Overall	Mean	1.75	2.52	2.66	3.71	3.80	5.56
		Rank	(1)	(2)	(3)	(4)	(5)	(6)
	F-value		6.35*	0.48	5.92	0.94	3.12**	0.19
Qualification	Up to graduate	Mean	1.50	2.91	2.53	3.78	3.67	5.70
		Rank	(1)	(3)	(2)	(5)	(4)	(6)
	Post graduate	Mean	2.00	2.19	2.79	3.65	3.93	5.41
		Rank	(1)	(2)	(3)	(4)	(5)	(6)

	Overall	Mean	1.75	2.52	2.66	3.71	3.80	5.56
		Rank	(1)	(2)	(3)	(4)	(5)	(6)
	F-value		5.89*	8.61*	1.14	0.25	1.22	0.19

** Significant at 5 percent* *** significant at 10 percent*

Note: A = Fluctuation in market price of shares

B = Study of earnings fluctuations

C = Changes in government policies

D = Frequency of changes in the management of the company

E = Study of company's borrowings

F = Others

When asked about the mechanism of managing risk, a majority of respondents (68.2 percent) prefer to invest on shares of different companies (Table 5.12). This shows the simple diversification is popular risk management technique among the investors. Very few investors prefer to make industry-wise diversification (6 percent) or bonds plus share mix. However, bonds, shares plus bank deposit mix attracted the attention of the investors (17.9 percent) as a risk management tool.

The significant chi-square value (18.27) shows that there is an association between the tools, used to manage investment risk and occupation of the respondents. However, there is not an association between the risk diversification tool, chosen by investors and their qualification (chi square value of 8.53 is not significant).

Table 5.12
Risk management mechanism

*This table provides the percentage of responses obtained by asking the survey question, **"How do you manage the risk on share investment?"** Categories of investors are presented in column and mechanisms of risk management are presented in row.*

Risk Management mechanism	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Investing in shares of different companies	85.4	14.6	68.2	41.7	58.3	68.2
Investing in shares of different industry	44.4	55.6	6.0	66.7	33.3	6.0

groups						
Investing in bonds and share portfolios	70.0	30.0	6.6	40.0	60.0	6.6
Investing in bonds, shares & bank deposits	91.5	8.5	17.9	70.4	29.6	17.9
Others	90.0	10.0	1.3	50.0	50.0	1.3

Sources of financing to investment also give an insight to risk inherent in the share investment. Table 5.13 reports that the majority of respondents (73.7 percent) financed their investment in shares through personal savings followed by financing through bank and financial institutions (23.1 percent). This leads to conclude that Nepalese investors also practice margin buying (buying shares by borrowing loans). Simultaneously, banks and financial institutions provide margin lending to the investors for share investment. Obviously, this practice helps to get a leverage benefit and incur additional risk to the investors. Further, the margin lending practices require an attention especially to banks and financial institutions, as it is an additional source of credit risk.

Table 5.13
Sources of financing in share investment

*This table provides the percentage of responses obtained by asking the survey question, "**How do you arrange funds for investment in shares?**" Categories of investors are presented in columns and sources of financing are presented in rows.*

Sources of financing	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Personal savings	82.6	17.4	73.7	45.2	54.8	73.7
Borrowing from FNR	50.0	50.0	1.3	50.0	50.0	1.3
Borrowing from FI	94.4	5.6	23.1	61.1	38.9	23.1
Borrowing from brokers	89.1	10.9	1.3	50.0	50.0	1.3
Borrowing from PF	89.0	11.0	0.5	88.9	11.1	0.5
Others	5.0	95.0	0.1	5.0	95.0	0.1

FNR=Friends, neighbors, relatives, FI=Financial institutions, PF=provident fund

The chi-square values, which are not significant, imply that there is not an association between the sources of financing and occupation (and qualification) of investors.

(f) Efficiency in stock market transactions

In an efficient market, the stock market including the stock exchange is expected to process and clear the transactions faster. The time-lag to transfer the certificate to the buyer of the security of listed companies is short and orders are executed timely and as instructed by the investors.

Tables 5.14 and 5.15 exhibit that majority respondents feel their orders be executed according to their specification of price and quantity. Still 30 percent respondents feel that their orders were seldom or never executed at the price they specify in the order form. Similarly, about 27 percent of the respondents feel that their orders were seldom or never executed at specified quantity. However, as the chi-square value suggested that there is not an association between the frequency of order execution and the occupation (and qualification) of the respondents.

Table 5.14
Order execution in specified price

*This table provides the percentage of responses obtained by asking the survey question, **"Were your orders executed at the price you specified in order form?"** Categories of investors are presented in column and time execution for specified price is presented in rows.*

Order execution in specified price	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Frequently	82.6	17.4	31.5	45.7	54.3	31.5
Often	83.6	16.4	37.7	45.5	54.5	37.7
Seldom	93.8	6.2	21.9	59.4	40.6	21.9
Never	92.3	7.7	8.9	61.5	38.5	8.9

On the other spectrum, majority practitioners also feel that their orders often were executed at the specified quantity whereas the academicians feel their orders were executed frequently. There is no association between the execution of orders in specified quantity and the occupation of respondents as chi-square value is not significant.

Table 5.15
Order execution in specified quantity

*This table provides the percentage of responses obtained by asking the survey question, **"Were your orders executed at specified quantity?"** Categories of investors are presented in column and frequency of execution for specified quantity is presented in rows.*

Order execution in specified quantity	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Frequently	75.7	24.3	25.7	40.5	59.5	25.7
Often	88.2	11.8	47.2	51.5	48.5	47.2

Seldom	88.5	11.5	18.1	53.8	46.2	18.1
Never	92.3	7.7	9.0	53.8	46.2	9.0

A majority of the respondents (52 percent) also feels that it takes more than a month to get stock certificate after making a transaction in secondary market (Table 5.16). This shows an important indication of inefficiency in stock market in Nepal. In Nepal, there is not a practice of scrip-less transaction in the absence of central depository system (CDS). Therefore, the time lag in transferring stock certificates to the buyer is a major indicator of inefficiency in stock market.

The chi-square value suggests that there is not an association between the occupation (and qualification) of respondents and their experience of getting stock certificates after transactions.

Table 5.16
Time lag in getting stock certificate

*This table provides the percentage of responses obtained by asking the survey question, **"How long does it take to get stock certificates after transaction is completed?"** Categories of investors are presented in columns and time taken to get stock certificate is presented in rows.*

Time to get stock certificate	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Within 5 days	60.0	40.0	3.3	20.0	80.0	3.3
5 - 10 days	85.0	15.0	13.3	35.0	65.0	13.3
10 - 20 days	71.4	28.6	14.0	47.6	52.4	14.0
20 - 30 days	92.3	7.7	17.3	50.0	50.0	17.3
Over 30 days	87.2	12.8	52.0	55.1	44.9	52.0

The mode of getting or making payment also provides an indication about the efficiency of market. In a developed and efficient market, quick and secured means of transfer and payments are used whereas in a traditional and inefficient market, cash payment systems are in practice. Table 5.17 exhibits that a majority of respondents (62

percent) makes or gets payments in cash followed by bank clearances (33.6 percent). This also indicates that Nepalese stock market is not so far efficient in settling transaction by using more secured means of payment. The chi-square value, which is not significant, further suggests that there is not an association between the occupation (and qualification) of respondents and mode of making or getting payments after transactions.

Table 5.17
Mode of making or getting payments

*This table provides the percentage of responses obtained by asking the survey question, **"How do you make or get payment with brokers?**" Categories of investors are presented in columns and modes of payment are presented in rows.*

Mode of payment	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
In cash	78.5	21.5	62.4	45.2	54.8	62.4
Opening account with brokers	93.7	6.3	3.4	40.0	60.0	3.4
Through bank clearance	95.0	5.0	33.6	56.0	44.0	33.6
Through credit card	92.4	7.6	0.7	8.8	91.2	0.7

As regards to the number of brokers dealt, Table 5.18 shows that the majority of respondents (57.4 percent) agreed to deal with only one or two brokers. It is obvious that investors do have their long-term relation with the brokers to facilitate the investment transaction. It is, however, risky; basically where there are a limited number of brokers with poor regulatory and supervisory environment. The chi-square value, which is not significant, indicates that there is not an association between the number of brokers dealt and the occupation (and qualification) of respondents.

Table 5.18
Number of brokers dealt by investors

*This table provides the percentage of responses obtained by asking the survey question," **How many brokers have you dealt with?"** Categories of investors are presented in columns and numbers of brokers dealt with are presented in rows.*

No. of brokers dealt	Occupation			Qualification		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall

One	90.7	9.3	28.7	67.4	32.6	28.7
Two	83.7	16.3	28.7	41.9	58.1	28.7
Three	85.3	14.7	22.7	38.2	61.8	22.7
Four	92.3	7.7	8.7	38.5	61.5	8.7
Five and more	82.4	17.6	11.3	52.9	47.1	11.3

When asked to the respondents the reason for dealing with more than one brokers, the sharing of experiences of others (36.2 percent) appeared to be the most important (Table 5.19). There are very few respondents (6.9 percent) who do not like the behavior of the broker and switch to others. However, some respondents (23.3 percent) also shift their dealings with more than one broker to get more information regarding the behavior of stock market.

The chi-square values, which are not significant, indicate that there is not an association between the reasons for dealing with more than one broker and occupation (and qualification) of respondents.

Table 5.19

Reasons for dealing with more than one broker

This table provides the percentage of responses obtained by asking the survey question, ***"If you have dealt with more than one broker, what may be the reasons?"*** *Categories of investors are presented in column and reasons of dealing with more than one broker are presented in rows of both panels.*

Reasons of dealing with more than one broker	**Occupation**			**Qualification**		
	Practitioners	Academicians	Overall	Up to graduate	Post graduate	Overall
Broker was not good	62.5	37.5	6.9	50.0	50.0	6.9
To share the experiences	88.1	11.9	36.2	50.0	50.0	36.2
To get more information	92.6	7.4	23.3	37.0	63.0	23.3
To get competitive benefit	90.0	10.0	17.2	50.0	50.0	17.2

To minimize the cheating chances	68.8	31.3	13.8	37.5	62.5	13.8
Others	90.0	10.0	2.6	33.3	66.7	2.6

(g) Awareness on rights of the shareholders

Table 5.20 presents frequencies, means, and ranks for the 9 questionnaire items for each of the four categories by respondent groups regarding the awareness of shareholders' rights. The item receiving the highest ranking for practitioners, academicians and postgraduates is the right to receive dividends as declared by the company (item 6). The item has mean scores of 1.49 for practitioners, 1.48 for academicians and 1.41 for postgraduates. Also, more than 90 percent of all occupation and qualified respondents were either very aware or aware that this right is much fundamental and important. Up to graduates (who represent 49.3 percent of the respondents) did not perceive this right to be as important (a rank of 2 with mean score of 1.58). The right to receive share certificate in due time (item 5) has got the highest mean score for up to graduates. The item has mean scores of 1.47 for up to graduates.

The right to receive dividends, declared by the company (item 6), has the second highest mean score for up to graduates. Similarly, right to receive share certificate in due time (item 5), right to sell shares at any time (item 9) has got the second highest mean score for practitioners, academicians and postgraduates, respectively.

The ranking for the remaining items are indicative of the difference in importance of certain topics for respondent group. Academicians and postgraduates consider the right to receive share certificate in due time (item 5) to be the third item in their list of awareness (mean score 1.74 and 1.65 respectively). Surprisingly, the fourth most important item for both the occupation and education group is the right to receive annual report before AGM (item 4) with mean score of 1.81 (practitioners), 1.87 (academicians), 1.81 (up to graduates) and 1.84 (postgraduates).

Similarly, both the groups of respondents assign a rank of 5 to voting right for electing the member of the Board of Directors. This item received a mean score of 2.19 (practitioners), 2.00 (academicians), 2.33 (up to graduates) and 2.00 (postgraduates).

The right to vote on motions, presented in the AGM (item 7) has been assigned the rank of 6 by practitioners and academicians as well as postgraduates; while up to graduates assign it 7th rank. Those up to graduates assign 6th rank to the right to become a candidate for the member of the Board.

The overall results from the analysis show that the respondents are aware about some of the important rights of the shareholders. They are aware about the right to receive share certificate in due time, right to receive dividends declared by the company, right to vote on the motions presented in the AGM. Still there are respondents who either do not know, are not aware or unaware at all about the rights of the shareholders. As expected, in an efficient market investors are fully aware about their rights. However, as exhibited in Table 5.20, still some respondents are not fully aware about the rights indicating the lack of efficiency in the stock market of Nepal.

Table 5.20

Frequency distribution, means, and ranks of respondents on awareness on rights of the shareholders

This table shows the weighted average responses (mean) obtained by asking the survey question ***"How far you are aware regarding the following rights of the shareholders?"*** *Categories of investors by occupation as well as qualification are presented in rows (right) for each right of shareholders (left) and level of awareness are presented in second to sixth columns (1 = Very aware, 2 = Aware, 3 = Do not know, 4 = Not aware,5 = Not aware at all). Weighted averages are presented in seventh column, and rank based on weighted mean (1 = highest rank and 9 = lowest rank) in eighth column.*

Particulars	1	2	3	4	5	Mean	Rank	Category	
To apply for conducting AGM	17.6	31.2	16.0	14.4	20.8	2.90	8	Practitioners	Occupation
	26.1	17.4	52.2	4.3	0.0	2.35	7	Academicians	
	18.6	27.1	22.9	15.7	15.7	2.83	8	Up to graduate	Qualification
	19.2	30.8	20.5	10.3	19.2	2.79	8	Post graduate	
To became a candidate for the member of the Board	31.7	26.2	11.1	19.8	11.1	2.52	7	Practitioners	Occupation
	30.4	21.7	26.1	17.4	4.3	2.43	9	Academicians	
	31.4	27.1	14.3	18.6	8.6	2.46	6	Up to graduate	Qualification
	31.6	24.1	12.7	20.3	11.4	2.56	7	Post graduate	
To inspect the share register book in corporate office.	21.3	18.9	18.9	22.0	18.9	2.98	9	Practitioners	Occupation
	17.4	47.8	17.4	13.0	4.3	2.39	8	Academicians	
	20.8	18.1	20.8	23.6	16.7	2.97	9	Up to graduate	Qualification

	20.5	28.2	16.7	17.9	16.7	2.82	9	Post graduate	
To receive annual report before AGM	45.3	40.6	5.5	4.7	3.9	1.81	4	Practitioners	Occupation
	47.8	30.4	13.0	4.3	4.3	1.87	4	Academicians	
	44.4	43.1	4.2	4.2	4.2	1.81	4	Up to graduate	Qualification
	46.8	35.4	8.9	5.1	3.8	1.84	4	Post graduate	
To receive share cert. in due time	59.1	35.4		3.9	1.6	1.54	2	Practitioners	Occupation
	47.8	43.5		4.3	4.3	1.74	3	Academicians	
	58.3	38.9		2.8	0.0	1.47	1	Up to graduate	Qualification
	56.4	34.6		5.1	3.8	1.65	3	Post graduate	
To receive dividends as declared by the company	69.5	20.3	3.9	3.9	2.3	1.49	1	Practitioners	Occupation
	65.2	30.4	0.0	0.0	4.3	1.48	1	Academicians	
	63.9	25.0	4.2	2.8	4.2	1.58	2	Up to graduate	Qualification
	73.4	19.0	2.5	3.8	1.3	1.41	1	Post graduate	
To vote on the motions presented in the AGM	38.3	28.9	9.4	11.7	11.7	2.30	6	Practitioners	Occupation
	30.4	52.2	0.0	17.4	0.0	2.04	6	Academicians	
	34.7	25.0	11.1	13.9	15.3	2.50	7	Up to graduate	Qualification
	39.2	39.2	5.1	11.4	5.1	2.04	6	Post graduate	
To vote to elect the member of the Board	42.2	27.3	10.2	10.2	10.2	2.19	5	Practitioners	Occupation
	30.4	47.8	13.0	8.7	0.0	2.00	5	Academicians	
	37.5	26.4	13.9	9.7	12.5	2.33	5	Up to graduate	Qualification
	43.0	34.2	7.6	10.1	5.1	2.00	5	Post graduate	
To sell shares at any time.	68.8	19.2	3.2	4.0	4.8	1.57	3	Practitioners	Occupation
	65.2	17.4	4.3	13.0	0.0	1.65	2	Academicians	
	65.7	20.3	2.9	4.3	7.2	1.68	3	Up to graduate	Qualification
	70.9	17.7	3.8	6.3	1.3	1.49	2	Post graduate	

The evaluation of order management, risk management, reaction over the news, stock market transactions and awareness about shareholders rights suggests that:

- Majority respondents prefer to buy or sell in prevailing market price (or make market orders).
- Majority respondents make weekly order (validity for a week) to buy or sell shares.
- Majority respondents are round lotters in primary market and odd lotters in secondary market.
- Majority respondents reacted to buy the shares in case of likely events of announcement of cash dividends, bonus shares, right issues and public issue of new shares.
- Majority respondents reacted to sell shares in the likely events of declines in profits as shown by the quarterly financial report or member of the board or company blacklisted.

- Majority respondents denied to trade if the company launches new product in the market or central bank revised up the key policy interest rate.
- Simple diversification (investing in the shares of different companies) is a popular risk management technique among respondents.
- Majority respondents do manage funds from their personal savings for investment in shares. However, they are also involved in margin buying through borrowing funds from banks and financial institutions.
- Majority respondents feel that their orders are executed in specified price and quantity.
- Majority respondents experienced that it takes more than a month to get stock certificates after making transaction.
- Majority respondents settle their payments in cash. So, cash transaction is popular means of payment among the respondents.
- Majority respondents have dealt with one or two brokers in their trading history. Those who have dealt with more than one brokers reasoned that they want to share the experience from others first.

Regarding the awareness of shareholders' right, majority investors are aware about certain rights such as right to get share certificate in due time, or dividend as declared by the company. There are some respondents who are not still aware or not aware at all about some of the fundamental rights of the shareholder.

5.4 Survey results of listed companies

The study is further extended to analyze the opinion of executives of the listed companies. The questionnaire was distributed to the Chief Executives of all the listed companies. Only 83 (66.4 percent) usable questionnaire was returned for further analysis. As classified by Nepal Stock Exchange, panel A and B of Table 5.21 exhibit that the respondents include 12 (14.5 percent) from commercial banks, 5 (6 percent) from development banks, 42 (50.6 percent) from finance companies, 3 (3.6 percent) from hotels, 11 (13.3 percent) from insurance companies, 6 (7.2 percent) from manufacturing and processing companies and 4 (4.8 percent) from other group.

Table 5.21

Respondents' profile

Panel A: Industry wise

Respondent group	Number	Percentage	Total listed companies	Respondents as a percentage of total
Commercial banks	12	14.5	14	86
Development banks	5	6	7	71
Finance companies	42	50.6	44	95
Hotels	3	3.6	4	75
Insurance companies	11	13.3	14	79
Manufacturing and processing	6	7.2	29	21
Others	4	4.8	13	31
Total	83	100	125	66

Panel B: Deposit wise

Institutions	Number	Percentage
Depository	59	71.1
Non-depository	24	28.9
Total	83	100

For the analysis purpose, the respondents were classified into two broad groups: depository institutions (or institutions licensed with Nepal Rastra Bank) which include commercial banks, development banks and finance companies, and non-depository institutions, which include hotels, insurance companies, manufacturing and processing and others. Thus, the number of respondents from depository institutions are 59 (71.1 percent) and from non-depository institutions are 24 (28.9 percent).

The Table 5.21 further highlights that 12 (86 percent) out of 14 commercial banks listed during the period, responded the questionnaire. Similarly, out of listed development banks, finance companies and hotels, 71 percent, 95 percent and 75 percent, respectively responded the questionnaire. The detailed analyses of the results of the survey are presented below:

(a) Efficiency in share listing issues

When respondents are asked to rank the reasons for listing the shares in Nepal Stock Exchange, both depository and non-depository institutions give reason to comply with the instructions of regulatory bodies first (Table 5.22A). The reason ranking first is quite obvious because there are provisions in the Banks and Financial Institutions Act (BAFIA) have provisions and in regulations issued by the Nepal Rastra Bank for commercial banks and financial institutions those compel the depository institutions to list the shares in stock exchanges. The next important reason for listing shares is to provide liquidity. However, this reason is not important for non-depository institutions as they assign the rank of 5 to this reason. Non-depository institutions list shares to increase prestige and publicity of the company as the second important reason, while depository institutions assign this as the third important reason.

Both depository and non-depository institutions assign the similar ranking to reasons such as to make valuation of shares (a rank of 4) and to provide liquidity (a rank of 6). The F-values, which are not significant, suggests that there is not significant difference between the rank assigned by depository and non-depository institutions.

Table 5.22 A
Means and ranks of responses to questionnaire on reasons for listing shares

This table provides the weighted average responses (mean) obtained by asking reason through the survey question, ***"Why did you list shares in Nepal Stock Exchange?"*** *Means and ranks of each reason are presented for non-depository, depository and overall institutions in columns second, third and fourth and F-value in last column.*

Reasons for listing	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Comply the regulator's instruction	2.4	1	2.5	1	2.5	1	0.01
Provide marketability	3.6	5	3.1	2	3.2	2	1.78
Increase prestige and publicity of the company	2.9	2	3.4	3	3.3	3	1.28
Make valuation of shares	3.3	4	3.5	4	3.4	4	0.17
Raise funds for profitable investments	3.2	3	3.9	5	3.7	5	2.68
Provide liquidity	4.2	6	4.0	6	4.1	6	0.12
Others	7.0	7	6.8	7	6.9	7	0.36

** significant at 1 percent ** significant at 5 percent *** significant at 10 percent*

Regarding the benefits of listing, the respondents assign first rank to gaining national importance (Table 5.22B). However, non-depository institutions assign second rank to this benefit of listing. Non-depository institutions feel that the important benefit from listing is to get full and timely information of the company. Both depository and non-depository institutions agree to assign a rank of 3 as a benefit of listing to encourage institutional investors. In overall, the benefit of broadening and diversifying shareholding however was assigned the third rank. The respondents felt less important benefits of listing as easy to obtain loans from banks and financial institutions and tax benefit from listing. The significant F-values for broadening and diversifying shareholding, constant price quotations and easy to obtain loans indicates that both depository and non-depository institutions differ significantly in ranking these benefits of listing.

When asked to rank the various disadvantage of listing shares, both the depository and non-depository institutions feel that excessive listing fees is foremost demerit of listing (Table 5.22C). The second rank is assigned to unnecessary interventions by the regulators. Depository institutions do also feel that the second important demerit from listing is an additional staff costs. The other lower rank demerits of listing are stringent supervisory burdens (4^{th} rank in overall) and loss of privacy in business (5^{th} rank in overall). The F-value for all the items included in questionnaire list of disadvantages from listing are not significant further indicates that the ranking of these items do not differ significantly by both the depository and non-depository institutions.

Table 5.22 B
Means and ranks of responses to questionnaire on benefits of listing shares

*This table provides the weighted average responses (mean) obtained by asking the survey question, "***What are the major benefits from listing?"** *Means and ranks for each benefit are presented for non-depository, depository and overall institutions in columns second, third and fourth and F-value in last column.*

Benefits of listing	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Gaining national importance	2.4	2	2.7	1	2.6	1	0.33
Full and timely information on the company	2.3	1	2.8	2	2.7	2	1.37
Broadening and diversifying shareholding	3.6	4	2.8	2	3.0	3	3.22***
Encourage institutional investors	3.1	3	3.3	3	3.2	4	0.21
Constant price quotations	5.4	5	4.2	4	4.5	5	5.43**

Easy to obtain loans	3.6	4	5.0	5	4.6	6	12.05*
Any tax benefit	6.0	6	5.7	6	5.8	7	0.25
Others	8.0	7	6.0	7	6.7	8	0.33

** Significant at 1 percent   ** significant at 5 percent   *** significant at 10 percent*

Finally in listing issue, the respondents were asked to rank the important issues that need to be revised by the regulatory authorities. As from Table 5.22D the respondents feel that the first important issue that requires attention by the authorities is to revise the corporate governance rules. However, non-depository institutions feel to revise the disclosure requirements more importantly than the corporate governance issues. The revision in rules and regulations relating to accounting standards and annual general meetings (AGM) also need to take attention by the regulators.

The F-value for corporate good governance suggests that both depository and non-depository institutions rank differently at 10 percent level of significance. For other items, however, there is not significant difference in ranking by depository and non-depository institutions.

Table 5.22 C
Means and ranks of responses to questionnaire on disadvantages of listing shares

This table provides the weighted average responses (mean) obtained by asking the survey question, ***"What are the disadvantages from listing shares?"*** *Means and ranks of each disadvantage are presented for non-depository, depository and overall institutions in columns second, third and fourth and F-value in last column.*

Disadvantages of listing shares	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Excessive listing fees	2.2	1	2.1	1	2.1	1	0.02
Unnecessary interventions from regulators	2.6	2	3.0	2	2.9	2	1.10

Additional staff costs	2.8	3	3.0	2	3.0	3	0.38
Stringent supervisory burdens	3.2	5	3.1	3	3.1	4	0.07
Loss of privacy in business operations	3.1	4	3.4	4	3.3	5	0.73
Others	5.7	6	4.8	5	5.1	6	0.37

Significant at 1 percent ** significant at 5 percent * significant at 10 percent*

Table 5.22D
Means and ranks of responses to questionnaire on issues on listing requirements revision

This table provides the weighted average responses (mean) obtained by asking the survey question, regarding the listing requirements need to be revised. Means and ranks for each requirement need to be revised are presented for non-depository, depository and overall institutions in columns second, third and fourth and F-value in last column.

Listing requirements need to be revised	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Corporate good governance	2.4	**2**	1.8	**1**	2.0	**1**	3.1***
Disclosure requirements	2.3	**1**	2.4	**2**	2.4	**2**	0.1
Accounting standards	2.5	**3**	3.1	**3**	3.0	**3**	1.8
Compulsion on holding AGM	3.6	**4**	3.9	**5**	3.8	**4**	0.2
Others	7.0	**7**	3.4	**4**	4.0	**5**	1.0
Annual review of turnover	4.3	**5**	4.5	**6**	4.4	**6**	0.4
Diversity of shareholdings	4.8	**6**	4.6	**7**	4.7	**7**	0.1

Significant at 1 percent ** significant at 5 percent * significant at 10 percent*

To conclude the listing issues:

- The respondents feel that the most important reason for listing is to comply with regulatory instructions rather than other reasons such as marketability provided by the listing or increase in prestige and publicity of the company or price discovery through valuation of shares or liquidity provided by listing. This ranking is important from the point of view of market efficiency. This shows that Nepalese corporate enterprises prefer to list shares not importantly for other reasons rather to comply with regulators instruction. This reason is not compatible with the market efficiency norms.

- The respondents do also feel that the most important advantage from listing is to gain national importance. The other issues and benefits from listing, which are important from EMH point of view, were less important for the respondents such as encouraging institutional investors, broadening and diversifying shareholding and constant price quotations.

- The major disadvantage of listing as envisaged by the respondents is excessive listing fees. The other disadvantages such as loss of privacy in business or additional staff costs or regulatory interventions were not felt important disadvantages by the listed companies. In this regard, these companies are more cost sensitive in listing issues.

- A majority of the respondents felt existing listing requirements be revised. The important issue that needs to be revised as felt by the respondents is corporate governance areas. The next issue that needs attention is disclosure requirements and accounting standards. From EMH perspective, the issues prioritized by the respondents are crucial. The shortcomings in these areas further suggest that Nepalese stock market is still not gaining efficiency.

(b) Efficiency in public issue of shares

In an efficient market, it is expected that the public issue of shares is based on long-term capital plan of the firm, should be less costly and rightly subscribed by the investors. Accordingly, Table 5.23A provides responses by the listed companies on efficiency in public issue management. As reported by the table, the important item that is considered by the respondents before making public issue is to prepare long-term plans and utilize experts' service. The respondents assign second rank to the prescription from regulatory bodies. While ranking these items, both depository and non-depository institutions do not differ significantly as the table reports the non-significant F-values.

Table 5.23 A
Means and ranks of responses to questionnaire on capital plan

This table provides the weighted average responses (mean) obtained by asking the survey question, regarding the process of capital plan decision. Means and ranks for process are presented for non-depository, depository and overall institutions in columns second, third and fourth and F-value in last column.

Capital plan decision process by	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Preparing long-term financial plans	1.6	1	1.5	1	1.5	1	0.21
Using experts service	1.6	1	1.5	1	1.5	1	3.82
Prescriptions from regulatory bodies	1.9	2	1.9	2	1.9	2	0.04
Others	3.3	3	3.5	3	3.4	3	0.08

Significant at 1 percent   ** significant at 5 percent   * significant at 10 percent*

When asked about the status of subscription in the public issue of shares by these companies, a majority (81.3 percent) of the respondents observed over-subscription in their issue (Table 5.23B). Only 10 percent observed the public issue of shares was subscribed in right amount. Very few (1.3 percent) respondents observed that the issue was not subscribed at all. Within the depository institutions, the over-subscribed institutions were even higher (86.2 percent) than non-depository institutions (68.2 percent). Whereas non-depository institutions observed non-subscription, no depository institutions felt such reaction by investors. The chi-square value, which is not significant, indicates that there is not an association between the subscription of capital and nature of institution.

Table 5.23B
Status of initial public offerings (IPO) subscription

*This table provides the percentage responses obtained by asking the survey question, **"How is your initial public offering subscribed?"** Categories of institutions are presented in columns and subscription status is presented in rows.*

Subscription status	Non-depository	Depository	Overall
Over subscribed	68.2	86.2	81.3
Under subscribed	13.6	5.2	7.5
Rightly subscribed	13.6	8.6	10.0
Not subscribed at all	4.5	0.0	1.3

The floatation costs, associated with issuance of shares, is also a barometer of efficiency in the market. High floatation costs generally indicate inefficiency in the market. Table5.23C provides the magnitude of floatation cost as a percentage of issue for both the depository and non-depository institution. It has been observed that the floatation costs of public issue of shares lie within the range of one to four percent of issue amount. Within the non-depository institutions more than 80 percent respondents observe the floatation cost lies within the range of one to four percent. No non-depository institution observed the floatation cost of more than 6 percent, whereas some depository institutions observed even higher cost of issue (more than 10 percent). The chi-square value, which is not significant, further suggests that there is not an association between the floatation cost and nature of listing companies.

Table 5.23C
Floatation cost of initial public offerings (IPO)

This table provides the percentage responses obtained by asking the survey question, ***"How much flotation cost you have incurred in issuing shares to public?"*** *Types of institutions are presented in columns and floatation costs as a percentage of initial public offerings are presented in rows.*

Floatation cost	Non-depository	Depository	Overall
1 - 2 % of issue	56.3	35.4	40.6
2 - 4 % of issue	25.0	29.2	28.1
4 - 6 % of issue	18.5	12.5	14.1
6 - 8 % of issue	0.1	8.3	6.3
8 - 10 % of issue	0.1	8.3	6.3
Over 10 percent	0.1	6.3	4.7

While making public issue of shares, companies should file documents with various regulatory authorities such as Company Registrars Office (CRO), Security Board/Nepal (SEBO/N) and others (Nepal Rastra Bank, Insurance Committee etc) and get approval from these institutions. As expected, in efficient market the time lag for processing such applications by these institutions should be quick or very quick. When asked how long it takes them to process the documents and get approval, majority respondents felt that it is reasonable or lengthy process (Table 5.23D). More than 80 percent respondents felt such time lag in processing and getting approval from all these three types of institutions. Both non-depository and depository institutions agree on this issue of time consumption by regulatory bodies, which are evidenced by the non-significant chi-square values.

Table 5.23D
Time taken by regulatory bodies to process the proposal of public issue

*This table provides the percentage responses obtained by asking the survey question, **"How do you observe the time taken by regulatory body to process you proposal for public issue?"** Different time lags for each regulatory body are presented in rows and types of institutions are presented in columns. χ2 -value is also provided in the last column of the table.*

Regulatory bodies	Time lag	Non-depository	Depository	Overall
Company Registrars Office	Extremely lengthy	10.5	9.4	9.7
	Lengthy	21.1	50.9	43.1
	Reasonable	63.2	37.7	44.4
	Quick	5.3	1.9	2.8
Security Board/Nepal	Extremely lengthy	5.3	3.8	4.2
	Lengthy	26.3	30.2	29.2
	Reasonable	52.6	60.4	58.3
	Quick	15.8	3.8	6.9
	Very quick	0.0	1.9	1.4
Other regulatory body (NRB/Insurance committee)	Extremely lengthy	5.3	5.8	5.6
	Lengthy	26.3	23.1	23.9
	Reasonable	57.9	59.6	59.2
	Quick	15.7	3.8	6.9
	Very quick	0.1	1.9	1.4

Thus, the analysis of public issue management reveals the following:

- The respondents prefer to issue shares as per their long-term financial plans and use experts' services. This preference by the companies supports the prevalence of some degree of efficiency in the market.

- Public issues of the listed companies' shares were mostly over-subscribed. This trend is higher in depository institutions than in non-depository institutions. As exhibited in

Appendix-9 and Appendix-11, the top companies in terms of market capitalization, turnovers and profitability are from banks and financial institutions. These institutions are performing well in the stock market. Thus, the floatation of shares by these companies was overwhelmingly welcomed by the market with over subscription.

- However, in case of floatation cost, majority companies observed it to be within the range of one to four percent of the issue amount. Some of the depository institutions observed even higher ratio of this cost. Moreover, both depository and non-depository institutions feel that regulatory authorities like Company Registrars Office, Security Board/Nepal or Nepal Rastra Bank proceed their applications for issues within a lengthy or reasonable time period.

(c) Efficiency in stock market

Regarding the market efficiency issues, the respondents were asked how long it takes to transfer shares in the companies. A majority (82.6 percent) of the respondents are of the opinion that shares are transferred within 15 days in their companies (Table 5.24A). This response is even higher in depository institutions than in non-depository institutions. No depository institutions responded that transfers held beyond one month. The significant chi-square value suggests that there is an association between the time taken for transferring ownership and type of institution.

However, a majority of investors for similar type of questions responded that it takes more than a month to transfer the ownership of shares by listed companies. Such a dilemma leads that market is still inefficient in processing the transfer of ownership by listed companies quickly.

Table 5.24 A
Time taken by regulatory bodies to transfer the ownership of shares

This table provides the percentage responses obtained by asking the survey question, ***"How long does it take to transfer ownership of shares in your company?"*** *Different times for transferring the ownership of shares of companies are presented in rows. Percentage of responses for each time period to non-depository, depository and overall are presented in second, third and fourth columns respectively.*

Time taken for transferring	Non-depository	Depository	Overall
Within 5 days	21.7	36.8	32.5
Within 10 days	13.0	31.6	26.3
Within 15 days	34.8	19.3	23.8
Within 1 month	21.7	12.3	15.0
Beyond 1 month	8.7	0.0	2.5

In an efficient market, it is expected that listed companies should disclose all the price sensitive information and disseminate to the investors through quick and widely disbursed media. Accordingly, investors build their opinion regarding the trading of securities on the basis of such information released by the listed companies. Table 5.24B provides a mechanism of the information released by the respondents. The first priority is assigned to publishing quarterly report by the respondents. However, non-depository institutions differ in ranking quarterly report publication as their prime medium of information dissemination. They rank first the publication of annual report on AGM and assign second rank to the publication of quarterly report. Both institutions do not differ in assigning rank to opening websites or airing program in radio or television. The significant F-value on publication of quarterly and annual report indicates the depository and non-depository institutions differ in using these media of information dissemination.

Table 5.24 B
Mechanism of releasing information to general investors

This table provides the weighted average responses (mean) obtained by asking the survey question, **"How do you inform the financial position of your**

company to general investors?" *Means and ranks for information releasing mechanisms are presented for non-depository, depository and overall institutions in second, third and fourth columns respectively and F-value in last column.*

Mechanism of releasing information	**Non-depository**		**Depository**		**Overall**		**F-value**
	Mean	**Rank**	**Mean**	**Rank**	**Mean**	**Rank**	
Publishing quarterly report	1.5	2	1.1	1	1.2	1	7.0**
Publishing annual report on AGM	1.2	1	2.4	2	2.0	2	65.3*
Opening websites	2.4	3	2.8	3	2.7	3	1.0
Airing programs on radio and TV	3.1	4	3.5	4	3.4	4	1.9
Others	5.0	5	4.0	5	4.3	5	3.6

Significant at 1 percent ** significant at 5 percent * significant at 10 percent*

When the companies make decision affecting the market price of the shares, such decisions are price-sensitive. Nepal Stock Exchange has a provision that the listed companies provide such decision within 24 hours (one day) to the Exchange so as to make it public immediately. As Table 5.24C exhibits, only 25.3 percent respondents recognized that they provide such information within 24 hours (one day). Thus, a majority of the listed companies (74.7 percent) delay in making such information public. Moreover, it is a non-compliance of the stock exchange rule and major indicator of inefficiency in the market. The chi-square value which is not significant indicates that there is not an association between the time to make public the price-sensitive information and the type of institution.

Table 5.24 C
Time taken to make public the price sensitive decisions

This table provides the percentage responses obtained by asking the survey question, ***"How long does it take to make your company's price-sensitive decision public?"*** *Time lags taken by BOD in making price-sensitive decisions public are presented in rows. Percentage of responses for each time lag for non-depository, depository and overall are presented in second, third and fourth columns, respectively.*

Time taken for BOD decision to make public	Non-depository	Depository	Overall
1 day	14.3	29.6	25.3
2 day	14.3	20.4	18.7
3 day	19.0	22.2	21.3
4 day	14.3	7.4	9.3
More than 4 days	38.1	20.4	25.3

Finally, the respondents were asked whether they think the current price of the stock reflect the true value. In an efficient market, both the market price and intrinsic value of the stock do not differ significantly. A majority of respondents (52.6 percent) denied that the price represents the true value (Table 5.24D). Contrary to this, majority respondents within non-depository institutions (60 percent) opined that market price of the stocks reflect the true value.

Table 5.24 D
Does market price reflect intrinsic value?

This table provides the percentage responses obtained by asking the survey question, ***"Do you think that current market price of your company's stock reflects true value?"*** *The responses in terms of 'yes' or 'no' are presented in rows. Percentage of responses for non-depository, depository and overall are presented in second, third and fourth columns, respectively.*

Response	Non-depository	Depository	Overall
Yes	60.0	43.1	47.4
NO	40.0	56.9	52.6

When respondents were asked, "In what form does the price reflect the true value?" they believed that the intrinsic value represents future prospects of the company appeared first. (Table 5.24E). They further opined that the price is relatively stable at current price and shares of the company are voluminously trading at current price as second and third reason of reflecting the price as true value. Both depository and non-depository institutions assign the same ranking to each item and F-value being not significant further suggests that the opinion of both the institutions do not differ significantly.

Table 5.24 E
Opinion on reflection of market price by intrinsic value

This table provides the weighted average responses (mean) obtained by asking the survey question regarding the opinion on reflection of market price by intrinsic value. Means and ranks for reasons for reflection are presented for non-depository, depository and overall institutions in columns second, third and fourth columns and F-value in last column.

Reasons for reflection	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
The intrinsic value represents future prospects of the company	1.4	**1**	1.4	**1**	1.4	**1**	0.01
The price is relatively stable at current price	1.5	**2**	1.9	**2**	1.8	**2**	1.28
Shares of the company are voluminously trading at current price	2.4	**3**	2.4	**3**	2.4	**3**	0.01
Others	4.0	**4**	4.0	**4**	4.0	**4**	

** Significant at 1 percent   ** significant at 5 percent   *** significant at 10 percent*

The respondents who denied that the price reflect the true value reasoned that lack of expertise and professionalism in the market is the foremost one. Both depository and non-depository institutions assign the first rank to this item (Table 5.24F). However, for other reasons, depository institutions feel the excessive speculation as the second important reason for such deviation in value and price whereas this is the fourth important reason for non-depository institutions. Non-depository institutions opined that the second important reason is the lack of information and the third important one is infancy stage of stock market. Depository institutions, on the other hand, reverse this order of importance i.e. infancy stage of stock market third and lack of information fourth.

Table 5.24F
Opinion on non-reflection of market price by intrinsic value

This table provides the weighted average responses (mean) obtained by asking the survey question regarding the opinion on non- reflection of market price by intrinsic value. Means and ranks for reasons for non-reflection are presented for non-depository, depository and overall institutions in columns second, third and fourth and F-value in the last column.

Reasons for non-reflection	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Lack of expertise and professionalism	2.2	1	2.1	1	2.1	1	0.07
Excessive speculations	3.3	4	2.4	2	2.6	2	2.19
Infancy stage of stock market	3.2	3	2.8	3	2.9	3	0.68
Lack of information	2.7	2	3.2	4	3.1	4	0.55
Poor performance of brokers	3.6	5	3.8	5	3.8	5	0.11
Poor performance of companies	4.8	6	5.4	6	5.3	6	0.71

Significant at 1 percent ** significant at 5 percent * significant at 10 percent*

(d) Effectiveness of regulatory mechanisms

Effective regulation and supervision of the companies are integral parts of the efficient capital market for streamlining the market and protection of the investors' interest. Effective regulation prevents malpractices, excessive speculation, over and under pricing, non-disclosure and other types of wrong doings in the market. Thus, regulatory authorities should not only keep the rules and regulations in place, but also make frequent on-and off-site inspections of these companies. Table 5.25A provides the status of the frequency of inspection by Security Board/Nepal (SEBO/N, the chief regulator in capital market) to the listed companies. A majority of the respondents (73.4 percent) observed no inspection at all by SEBO/N. Very few responded that SEBO/N has inspected once in a six month or one year period. This warrants the SEBO/N to expand its capacity for strong supervisory oversight. The chi-square value which is not significant shows that there is not an association between the frequency of inspection by regulator (SEBO/N) and the type of institution.

Table 5.25 A
Frequency of SEBO/N inspection to listed companies

This table provides the percentage responses obtained by asking the survey question, ***"How frequently are you inspected by the security Board/Nepal?"*** *Frequencies of inspection by SEBO/N are presented in rows. Percentage of responses for each frequency for non-depository, depository and overall are presented in the second, third and the fourth columns, respectively.*

Frequency of inspection	Non-depository	Depository	Overall
Once in a six months	8.7	8.9	8.9
Once in a year	8.7	5.4	6.3
Once in two years	4.3	1.8	2.5
More than two years	13.0	7.1	8.9
Not yet inspected	65.2	76.8	73.4

In case of non-compliance, the regulators have a right to penalize the listed companies. The penalty might have different forms and degree-from restriction on dividend announcement to removal of the Board of Directors. A majority of the respondents (64.7 percent) which were penalized by the regulators for non-compliance, observed mostly the restrictions on dividend announcement (Table 5.25B). Such penalty has been imposed severely in depository institution (81.8 percent) compared to non-depository one 33.3 percent). Whereas non-depository institutions observed de-listing of shares (33.3 percent) and removal of board (16.7 percent) as a penalty for non-compliance, depository institutions were penalized from restriction in expansion of branches (11.8 percent). The chi-square value which is significant indicates that there is an association between the type of the penalty and the type the institution.

Table 5.25 B
Action taken against the companies for non-compliance

This table provides the percentage responses obtained by asking the survey question regarding the action taken by regulatory body against the companies for non-compliance. Actions against the non-compliance are presented in rows. Percentage of responses for each actions for non-depository, depository and overall are presented in the second, third and the fourth columns, respectively.

Action taken against the companies	Non-depository	Depository	Overall
Restriction on dividend announcement	33.3	81.8	64.7

Restriction on expansion of branch	0.0	18.2	11.8
Removal of board	16.7	0.0	5.9
De-listing of shares	33.3	0.0	11.8
Others	16.7	0.0	5.9

When respondents were asked to prioritize the problems with regulators, unnecessary delay in making decisions and forwarding files appeared the first (Table 5.25C). However, depository institutions prioritized the imposition of impractical rules and regulations as the first problem. The non-depository institutions, on the other hand, assign the item a rank of four. These institutions feel the highly bureaucratic behavior and less expertise in regulatory staffs as more important problems as they assign rank of two and three, respectively for these items. Both the institutions equally assign the rank of five to public disclosure of inside information by the regulators as a problem. The significant F-values on unnecessary delay in making decisions and forwarding files, and imposition of impractical rules and regulations suggest that depository and non-depository institutions differ in assigning ranks to these items significantly.

Table 5.25C

Means and ranks of responses to questionnaire on opinion on problems with regulators

This table provides the weighted average responses (mean) obtained by asking the survey question regarding the problems with regulators. Means and ranks for problems with regulators are presented for non-depository, depository and overall institutions in columns second, third and fourth columns and F-value in last column.

Problems with regulators	Non-depository		Depository		Overall		F-value
	Mean	Rank	Mean	Rank	Mean	Rank	
Unnecessary delay in making decisions and forwarding files	1.3	1	2.5	2	2.3	1	3.23***
Imposition of impractical rules and regulation	3.5	4	2.3	1	2.5	2	3.09***
Highly beaurocratic behavior	2.6	2	3.1	3	3.0	3	0.79
Less expertise in regulatory staffs	3.0	3	3.1	3	3.1	4	0.06
Unnecessary intervention in the	4.5	6	4.1	4	4.1	5	0.31

business of the company							
Public disclosure of inside information	4.0	5	4.9	5	4.8	6	1.92
Others	7.0	7	7.0	6	7.0	7	1.02

** Significant at 1 percent* *** significant at 5 percent* **** significant at 10 percent*

The evaluation of efficiency in stock market and effectiveness in regulatory and supervisory strength suggests that:

- A majority of the respondents is of the opinion that the transfer of ownership of shares took place within 15 days. However, the investors denied this claim of listed companies viewing that it takes more than a month. This controversy further suggests that there exist inefficiency in Nepalese stock market.

- Regarding the mechanism of publishing information for general investors, Publishing the quarterly report, rather than other means of disseminating information (such as websites or television and radio program) has been preferred. However, non-depository institutions prefer to publish annual report to inform general investors.

- A majority of the respondents feels that it takes more than four days to make public the price-sensitive decision taken by the Board of Directors' meeting. This also violates the stock exchange rule as well as it is against the norm of market efficiency.

- Majority respondents do not think that the current prices of the share reflect true (or intrinsic) value. Those who think it represents the true value responded with most important reason that intrinsic value represents the future prospect of the company. Those who do not think the current price represents the true value because of the lack of professionalism and expertise in the market. It further indicates the prevalence of inefficiency in the market.

- Majority respondents observed that the SEBO/N did not inspect them. This shows that effectiveness of regulatory bodies, especially the Security Board/Nepal- should be strengthened to regulate and supervise the listed companies.

- For non-compliance, the restriction on distribution of dividends has been taken as a major penalty tool for a majority of the companies.

- Mostly, the respondents feel that unnecessary delay in making decisions and forwarding files by regulators is the prime problem with these institutions. It also indicates that the market is still not achieving the level of efficiency.

5.5 Discussion

The efficient market hypothesis has not been supported by the survey results. The key players in the market, investors and listed enterprises, are suffering from many institutional, legal and regulatory problems that need to be addressed. The results indicate that investors in Nepal, though prefer to invest in shares and are well aware about their rights, still prefer to engage in primary market. Well informed investors are only trading in secondary markets. This indicates that the secondary market -which is a backbone of capital market- is not attracting the investors to grow the investment industry in Nepal. Further, a majority of the investors is not aware in consulting brokers before buying or selling securities in the market.

Moreover, the existence of the round lotter in primary market and odd lotter in the secondary market, lengthy process of transferring stock certificate, cash payment mechanism and personal savings as a source of financing share investment indicates inherent inefficiency in the market.

Regarding the listing companies' issue, the results indicate that there is a predominance of regulatory instructions for listing rather than other reasons. Most companies expect to revise the existing listing rules and regulations. The prime issue that is to be considered for reform is corporate good governance. Further, majority companies do not agree that the prevailing market price reflect the true (intrinsic) value of the shares.

However, some signs of efficiency also appeared from the results. Particularly, investment decision after the news become public and different kinds of likely events suggest that there is not an over or under reaction by individual investors. Most investors also prefer simple diversification as a tool to manage their investment portfolio. Similarly, the companies issue their shares to public after preparing long-term plans and over subscription status of their IPOs along with low floatation cost further provide some short of efficiency in stock market in Nepal.

Interestingly, there appears contradicting issues in opinion regarding the time taken by the companies to transfer share certificates after buying or selling shares in secondary market. Whereas individual investor claim it to be lengthy process and takes more than a month, listed companies deny this claim stressing that transfer takes within 15 days.

In the next chapter, the study provides a summary with major findings and implications. The chapter also concludes major recommendations and scope for further research.

Chapter VI

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

The studies on the behavior of stock prices play an important role in the development of an economy. Developing countries like Nepal need capital to boost the economic process by accumulating resources from private sector. Private sectors flourishes in the presence of efficient capital market. Efficient market helps in channelisation of savings and funds to profitable investment avenues thus ensuring maximum benefits to the society. In addition, globalization has now made pooling of funds from the investors around the globe possible. Nepal, being a member of different global (and regional) trading and economic forums, opened its doors for such financial resources from international community, and this provides both opportunities and challenges. As such, EMH is a predominant requirement for efficient and optimal allocation of such scare resources.

The EMH implies that all known information are immediately discounted by all investors and reflected in the prices of shares. This cannot be tested directly. However, one can analyse the market efficiency by postulating some securities price behavior. Initially developed in the year 1900 and subsequently revived by Fama (1965), the random walk model received increasing attention to describe the common stock price behavior. Similarly, the share price reaction to different events and calendar effects on share prices were tested and their application has largely been confined to the developed countries such as USA and UK. As usual, the developing nations such as Nepal lagged in this respect too. The present study constitutes a modest attempt to fill up this gap.

This study mainly aims at assessing efficiency of sock market in Nepal. Among the three types of efficiency (weak-form, semi-strong form and strong-form), this study covered only semi-strong form and weak form efficient market hypothesis. The specific objectives of the study are: (1) to analyze the stock price reaction over the public announcement of cash dividends by listed enterprises in order to measure the semi-strong form efficiency, (2) to assess the randomness of returns on stock market in order to identify whether successive price changes are independent of each other, (3) to examine calendar effects such as month-of-the-year and day-of-the-week in stock prices, (4) to analyze the size effects on calendar months and day of the week returns, (5) to evaluate the overall efficiency in the stock market in Nepal by conducting an opinion survey of investors and executives of listed companies.

This is the first study of its kind in Nepal. This study is based on secondary as well as primary data. The data used for testing semi-strong form EMH consists of 28 cases of cash dividend announcements made by 21 enterprises over diverse industries with no concurrent event during the test window. The data used for testing weak form EMH consists of 2344 daily, 508 weekend and 120 month-end observations of Nepal Stock Exchange index and also includes closing prices of 30 actively traded equity shares. The period covered by the study is mid-July 1995 to mid-July 2005. Using the same enterprises and data, the calendar effects on the stock prices and size effects were also tested. The survey of investors and executives of listed companies was accomplished during December 2006 to April 2007. Initially 350 structured questionnaires were distributed to investors using the systematic sampling technique. Questionnaires were also distributed to executives of all listed companies. A total of 156 respondents from individual investors and 83 listed companies provided their responses on different aspects of market efficiency in Nepal.

The methodology used to analyse the results include the 'event-study methodology' for stock market's reaction to the cash dividend announcement of companies to test semi-strong form EMH. The methodology includes the defining of the event of interest, specification of the day of announcement of an event, specification of the window period, computation of expected or normal return, computation of abnormal return for the window period for the sample companies, computation of the average abnormal return (AAR) for each day in the event period, computation of cumulative average abnormal return (CAAR) and conducting the test of significance. In a semi-strong form efficient market hypothesis, one would normally expect an abnormal return on the day of the announcement of cash dividend declaration, but not on other days.

Both 'parametric' and 'non-parametric' test along with descriptive analysis were used to test random walk hypothesis. In the former, autocorrelation (serial correlation) coefficients have been computed for one to thirty lags of log prices; the hypothesis being tested is that successive log price changes are serially independent. The random walk model is accepted for all the case, except where the magnitudes of observed coefficients turned out to be significant enough to warrant the rejection of the above hypothesis. Along with autocorrelation test, runs test-a non-parametric test-has been used to test the randomness of the stock market prices. In this case, the hypothesis of randomness has been tested by examining the extent of divergence between the expected and actual runs. Should the divergence be significant by usual statistical standards, the series is described as non-random; in all other cases the random walk hypothesis is regarded as a valid description of share price behavior.

The calendar effects have been analyzed by testing month-of-the-year and day-of-the-week effect on stock prices. For this purpose, the hypotheses tested in the study are: the mean returns for each month of the year and day of the week are not significantly different from zero. Similarly, the mean returns for each month of the year and day of the week are equal. Finally, there is no size effect in returns of each calendar months and day of the week. The regression model has been developed with month dummies, day dummies and size dummies. The significance of the t-values rejects the null hypothesis and indicates the presence of the calendar effects and size effects in the returns of the month-of-the-year or day-of-the week.

In order to survey the investors and executives of listed companies on efficient market hypothesis, two different sets of questionnaires were distributed. The survey generated a response rate of 44.57 percent for individual investors and 66.40 percent for listed companies. The survey results of the individual investors were analyzed to ascertain the difference in responses of different occupation and qualification of respondents. However, the results of listed companies were analyzed as per the responses of depository and non-depository sector of companies. For this purpose, a variety of statistical measures and tests were employed such as mean, standard deviation, chi-square and ANOVA tests.

Major Findings

Based on the analysis of data, the major findings of the study are as summarized as follows:

1. The analysis of the market reaction to dividend announcement shows that stock market in Nepal is not semi-strong form efficient. Thus, the stock prices do not contain the information in a quick manner that is published publicly, which leads investors to beat the market.

2. The insignificant abnormal returns during the event window along with most of the positive abnormal returns before and after the announcement date implies that investors do have already anticipated the announcement and gained from it.

3. The analysis of AARs and CAARs for the two sub-periods (pre and post 2001 i.e. before and after implementation of capital gain tax), however, shows that Nepalese stock market improves level of efficiency in post 2001 period, but it still is not sufficient enough to reflect the information content of the dividend announcement.

4. The further decomposition of the study into large and small dividend payment stocks reveals that low dividend payment has stronger effect than high dividend payment on the shareholders' wealth. The significant CAARs, however, for both the groups do not support the hypothesis that cash dividend provide useful information.

5. The analysis of random walk hypothesis shows that Nepalese stock market is not weak form efficient as well. Thus, the stock prices in Nepal show a systematic pattern that is valuable for reading information from observing the behavior of past price movements.

6. The market return as measured by NEPSE index is negatively skewed and leptokurtic irrespective of the daily, weekly or monthly interval of returns. This result is also supported

by the return behavior of majority of the enterprises. However, the number of negatively skewed companies reduced as the return intervals increase. Further, the Jarque-Bera values are significant for all three intervals of returns for market and individual companies imply the non-normal distribution of returns in stock market in Nepal. Thus, the descriptive statistics implies that Nepalese stock market is not weak-from efficient.

7. The first order autocorrelation coefficients of daily or weekly or monthly market returns as measured by NEPSE are not statistically significant. This indicates that market return series are random in one-day lag. However, for other lags (up to 30 days lag) the autocorrelation coefficients for the daily or weekly or monthly market returns are statistically significant. Thus, the available evidences on market returns suggest that the random walk hypothesis does not seem to fit on Nepalese stock market indicating the sign of serial dependence.

8. As far as the results from individual companies are concerned, share price behavior cannot be approximated by random walk model using daily returns. However, weekly and monthly returns of majority of the companies provide evidences of serial independence of returns supporting random walk model.

9. The total number of actual and expected number of runs are statistically significant for daily and weekly market returns as measured by NEPSE index, which implies that the prices changes in Nepalese stock market are substantially different from random series. However, the monthly market return that is not significant implies that future prices in Nepalese stock market cannot be predicted on the basis of historical monthly prices.

10. Quite contrary to the results of autocorrelation coefficients, the runs test results reveals that the majority of companies' returns on daily, weekly and monthly intervals provide some sort of randomness supporting the weak-form efficiency in the market.

11. No clear evidence of month-of-the-year effect has been observed. However, there appears higher and positive return in the month of October (significant in whole period and pre-

2001). This gives some signal of ‘October’ effect; possibly supporting the ‘Dashain’ effect in Nepalese stock market in place of ‘January effect’ appeared in US markets.

12. The analysis of the impact of size-sorted portfolio on calendar months evidenced that returns on April, July and November are significant. All these months are culturally important as Nepalese calendar year begins from ‘April’; fiscal year end in ‘mid-July’ and national festival Dashain and Tihar are celebrated in ‘October-November’.

13. As regards the day-of-the-week effect, there is no appearance of Monday (or Sunday) effect. However, the small firm effect (i.e. low market capitalization firms yield high return) has been observed for Thursday (pre-99) and Friday (post-99). Both Thursday and Friday are weekend days for the respective sub-periods.

14. Given the choice of investment, the responding group assigned the first priority to share investment followed by real estate, bank deposits, government securities, gold and silver and bonds. The respondents from different occupations gave significantly different ranks to bank deposits and gold and silver. Similarly, the majority of the respondents prefer to invest in primary markets rather than in secondary markets.

15. The single most important factor that motivated the respondents to buy shares is self-motivation. However, the next important factor that motivated them to invest in shares is the attraction of the profitability and growth of companies. Similarly, the majority of the respondents do not feel it necessary to consult the brokerage firms to undertake buying or selling of their shares.

16. The market order, i.e. to make orders to buy or sell in prevailing market prices, has been adopted by the majority of the respondents as an order type to make stock market transactions. Similarly, the majority of respondents make weekly orders (orders valid only for a week) to buy or sell shares from secondary market.

17. The number of shares purchased in the primary and secondary market reveals interesting evidences from the EMH point of view. The majority of respondents bought more than 100 shares from primary market (as a round-lot) and less than 100 shares from secondary

market (as an odd-lot). This indicates a lack of depth in secondary stock market in Nepal, the market that is of crucial importance for price discovery as well.

18. The reaction over the news and events by the respondents shows mixed results. The majority of respondents preferred to buy the shares in case of likely events of announcement of dividends; bonus shares rights and public issue of new shares by companies. Likewise, the majority of respondents preferred to sell shares in case of likely decline in profits as shown by quarterly report of the company, and member of the board or company itself become black-listed by competent authority. Further, the majority of respondents denied to trade in case of likely events that the company launches new product or central bank revises upward the key policy rate i.e. the refinance or discount rate.

19. Keeping into the consideration the tools to manage risk inherent in share investment, the majority of respondents prefer to invest in shares of different companies (simple diversification). Similarly, the majority of respondents arranged funds for share investment from personal savings followed by borrowings from financial institutions. This also indicates that margin buying is also practiced by Nepalese investors that warrant strong regulatory and supervisory oversight to maintain sound, safe and efficient financial system in the country.

20. The time lag for transferring share certificate by companies has been considered a major factor of market inefficiency in Nepal. The majority of the respondents experienced that it takes more than a month to get stock certificate after buying shares in secondary market. Similarly, majority of respondents settle the transactions in cash as a mode of making or getting payments.

21. The results also show that there is a consistency in dealing with brokers by the respondents. The majority of respondents make transactions with one or two brokers. The most important reason attributed by the investors who dealt with more than one brokers is to share the experiences from others.

22. The majority of respondents are quite aware about certain rights of the shareholders, such as right to get share certificate in time, right to get dividend as declared by the company and the like. However, there are some respondents who are still unaware or not aware at all about certain right of the shareholders.

23. As regards the listing issues, the respondents feel that most important reason for listing is 'to comply with the regulatory instructions'. The respondents do also feel that gaining national importance is a prime benefit from listing. The most important disadvantage felt by the respondents listing shares in stock exchange is the cost factor. The most important issue to reform in existing listing requirements as felt by the majority of respondents is the gamut of corporate governance.

24. While proceeding for issuing shares to public, the majority of the respondents preferably prepare long-term financial plans and use expert service. The initial public offerings (IPOs) of most of the responding companies were over-subscribed. The floatation cost (the cost of issuing shares to public) of IPOs of the majority of respondent companies' ranged between 2 to 4 percent of the issue.

25. The issue of the time lag in transferring ownership of shares evidenced the conflicting results from the view of investors. The majority of respondents expressed that it takes 15 days to transfer shares after making transaction by investors. This finding is not consistent with the view of the investors as the majority of them opined this time lag is more than a month (>30 days).

26. Regarding the mechanism of disseminating information to general public, the respondents assigned first rank to the publication of quarterly report. Similarly, the majority of respondents feel that it takes more than 4 days to make public the decisions of the BOD's that are price sensitive in nature. As per the Stock Exchange rules, price sensitive decisions are to be made public within 24 hours (1 day).

27. The majority of respondents do not think that current prices of the listed companies reflect their true (or intrinsic) value. The most important reason, they cited behind this, is the lack of expertise and professionalism in the market.

28. With respect to the effectiveness of the regulators in capital market especially SEBO/N, the majority of respondents observed that the institution did not inspect them yet. Similarly, the majority of the enterprises those are penalized by the regulators got penalty of restriction on announcement of dividends. The most important problem with regulators raised by the respondents is unnecessary delay in forwarding files.

Thus, the findings of this study are not supporting the EMH in Nepalese stock market. This also implies that there are serious drawbacks in the institutional, legal and regulatory sectors of the Nepalese capital market. In order to grow and develop the market for efficient allocation of resources, a number of reforms need to be initiated.

6.2 Conclusion

The major conclusion of this study is that EMH does not hold true for Nepalese stock market. The stock market is not efficient enough to incorporate publicly available and historical information in a quick and instantaneous manner to ensure semi-strong form and weak-form efficiency. However, some size effects on the calendar months and day-of-the-week have been detected further providing the evidence of anomalous stock market behavior. Moreover, the microstructure of the stock market in Nepal revealed that there are many impediments and lackings that have contributed to such inefficient behavior of the market.

The stock market in Nepal did not incorporate the public announcement of cash dividends by the listed companies which has led to conclude that Nepalese stock market is not semi-strong form efficient. The dividend announcement allows the investors to earn significant cumulative abnormal returns during the announcement periods. The result of the study is consistent with the findings of Kane *et al*. (1984) and Rao and Geetha (1996). Both the studies concluded that dividend announcements have significant effect on share prices leading to conclude that stock market is not efficient in semi-strong form. This holds true for sub-periods: pre-2001 and post-2001 (i.e. before and after the effective implementation of capital gains tax for investors).

The size of the dividend plays role in the rapidness of the stock market reaction. In case of Nepal, small dividends do have stronger effect than larger dividends in the stock market. The results are consistent with the Grinblatt *et al*. (1984). However, the investor gain of some value from the dividend announcements is not consistent with Miller and Modigliani (1961).

Consistent with the findings of Poshakwale (1996), Roux and Gilbersion (1978), Gandhi *et al*. (1980), Wong and Kwong (1984) and Abeysekera (2001), the stock prices in Nepal are not moving independently conforming that Nepalese stock is not weak form efficient. This holds true for majority of cases of index data and share prices of individual companies. Interestingly, the results of the study indicate that in some cases index appeared to follow random walk, some of its constituent shares displayed some degree of non-randomness. This finding is consistent with the Cooper (1982).

Though no clear evidences of moth-of-the-year and day-of-the-week effect has been observed in Nepalese stock market, October is found to be a month of highest return and Friday is found to be a day of highest return. Further, small firm effect has been observed in the month of July and large firm effect in April and November. However, no January effect and Monday effect has been observed in Nepalese stock market. Thus, the results of the study are not consistent with the findings of Rozeff and Kinney (1976), Schultz (1985), French (1980) and Jaffe and Westerfield (1985). However, higher stock returns on Friday is consistent with the findings of Cross (1973), Keim and Stambaugh (1984) and Lakonishok and Smidt (1988).

Thus, the non-existence of semi-strong and weak form efficiency in the market and some evidence of anomalous stock price behavior indicate that Nepalese investors have opportunity to beat the market based on such information. The professionals such as technical analysts and fundamental analysts do also have also sufficient grounds for utilizing their expertise for serving their clients. However, such an efficient market will not attract the investors for long time as such markets are risky, speculative and unsustainable. The evaluation of efficiency of the Nepalese stock market implies that the investors are not well informed about the price sensitive information, the market is less liquid, there is high reliance on a single brokers (given the case of limited number of brokers) and there exists a less effective supervisory and regulatory oversight. However, awareness of the Nepalese investors is increased regarding the various issues of stock market.

6.3 Recommendations

Based on the analysis and findings of the study, the major recommendations are provided as follows:

1. The study revealed that there are positive abnormal returns before the dividend announcement date. This indicates a chance of leakage of information in the market. Such kinds of leakages of information are against the norms of market efficiency. Therefore, steps and enforcement actions need to be taken to avoid such kind of leakage of information.

2. The information content of the dividend announcement is not incorporated even after the implementation of the capital gains tax in Nepal. The effective implementation of tax improves the efficiency of the market, as the investors become more price sensitive and tax sensitive. Thus, the investors should be encouraged to develop and prepare their 'investment and income account' to make the transactions more transparent.

3. Since stock market in Nepal is not efficient enough to reflect the dividend announcement information in prices, investors are enjoying abnormal profits on dividend paying stock. Thus, investors should invest on dividend paying stocks to make above normal profits.

4. As small dividend paying stocks yields higher excess returns than large dividend paying stocks, investors should invest in the portfolio of small dividend paying stocks to generate relatively higher excess returns (i.e. abnormal return).

5. The non-random character of stock prices implies that investors should take care of historical price and index data before making investment decision. They should use technical analysis tools like charts, histograms, moving averages etc. to detect information inherent in the stock prices. Technical analysts (or technicians) should also develop and provide such tools to the investors to help them make precise investment decisions.

6. The significant autocorrelation of returns at one day lag suggested that stock market in Nepal is efficient enough to incorporate the information embedded in the historical price

data. However, the insignificant autocorrelation of returns up to thirty day lag suggests that prices in Nepalese stock market are not moving independently. Therefore, investors should explore the information from daily movements of the prices of stocks considering the more than one day lag analysis to beat the market.

7. The study revealed that the daily prices of majority of individual enterprises are moving non-randomly and the weekly and monthly prices of majority of enterprises are moving randomly. Thus, investors should devote their efforts to analyze the daily movements of prices of the listed enterprises and should not waste the time and efforts to seek information from weekly and monthly price changes.

8. The results of the month-of-the-year effect suggest that the favorable month for small portfolio holders is July and for large portfolio holders are April and November. Thus, investors should take appropriate position on the respective portfolios to make excess returns in these months.

9. The study also revealed the small firm effect (portfolio of low market capitalization firms yield high return) on weekend day i.e. Friday. Thus, investor should take long position on the small-size portfolio of stocks at the beginning of the week and dispose off the portfolio at the weekend to gain abnormal return.

10. The survey results of the study showed that investors in Nepal prefer to buy shares from primary market rather than from secondary market and investors prefer round-lot in primary market and odd-lot in secondary market. Though the secondary market transaction is risky than primary market, it is important for liquidity, price formation and efficient allocation of resources. Thus, the authorities should educate and make the investors aware about the risk and benefits of stock market transactions in secondary market.

11. The survey further revealed that the prime sources of funds for investing in the shares are personal savings and borrowings from financial institutions known as ‘margin borrowing’. The international practice of margin trading is that investors borrow funds from brokerage firms and, which in turn, borrow from financial institutions. The central bank sets the minimum initial margin required to open the account with brokerage firms. Thus,

authorities should initiate to develop margin trading and short selling practices in Nepal according to international norms.

12. The results of the survey evidenced that the investors do not get stock certificate within a stipulated time (i.e. it takes about a month) after making transactions in secondary market. In order to make efficient market, the authorities should initiate scripless system and establish central depository system to perform share transfer within 3-5 days.

13. The survey results further indicated that the Board of Directors (BOD) of the listed enterprises is not disseminating the price sensitive information to the public within the stipulated time. Nepal Stock Exchange and Security Board/Nepal should, therefore, enforce the existing rule of making public the price sensitive decisions by the companies within 24 hours.

14. The survey results revealed that many of the listed enterprises are not inspected and supervised by the regulatory authorities. Hence, the Security Board/Nepal and Nepal Stock Exchange Limited should expedite their regulatory and supervisory role to cover all the listed companies for regular supervisory net. Similarly, there should be off-site monitoring unit within the Board and Nepal Stock Exchange Limited.

Scope for future research

15. Many studies on semi-strong form efficiency of stock market are focused on the analysis of information content of annual earnings and dividend announcement. Considering the precise quantitative relationship between the change in dividends and yield shifts, the announcement effect on the stock market can be carried out by modeling the daily changes of stock returns using the exponential generalized autoregressive conditional heteroscedastic (E-GARCH) approach in order to test the news effects of annual dividend (earnings) announcements on conditional mean of abnormal returns and the variance of returns.

16. This study has assumed that there is a linear relationship between the current price and historical prices of the stock. In emerging markets, it is expected that there exists non-linearity. Moreover, emerging markets are characterized by less frequent transactions

termed as “thin trading”. In order to incorporate these issues, the non-linear models need to be applied to test the independence of stock price behavior.

17. While examining the EMH, the time varying mean and variances in the stock prices and returns distribution are also attracting attention of the researchers. Especially, stock prices are found to have heteroscedastic character in emerging market volatility tests. To capture such stock price behavior, it would be appropriate to test the RWH using (G) ARCH models.

18. The bias from non-synchronous trading and its impact in stock market indices are also yielding conflicting results in many empirical analyses on EMH issues. To mitigate the confounding effect of non-synchronous prices on efficiency and random walk test, the true underlying indices need to be estimated by decomposing the index into its permanent and cyclical component.

19. This study has used runs test (a non-parametric test) to examine the random walk hypothesis in Nepalese stock market. The other tools such as variance ratio tests (also a non-parametric test) and unit root test, spectral analysis and filter rules techniques can be applied to test RWH.

20. This study has investigated the month-of-the-year effect and day-of-the week effect by estimating a dummy variable model using OLS. It is imperative to conduct the study by using rolling regression and more sophisticated structural time series model with an autoregressive structure.

21. The present study has focused the stock price reaction around the dividend announcement date. However, the ex-dividend date is equally important from the point of view of stock price reaction over the news related to dividend announcements. It is suggested that the study on reaction over the dividend announcements by stock market to be carried out by considering the ex-dividend date as an ‘event date’.

22. While evaluating the efficiency of the stock market in Nepal, this study has conducted a survey of investors and executives of listed companies. Such surveys need to be extended to

survey of the opinions of securities businesspersons, policy makers and independent practitioners to evaluate the efficiency in broader term.

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Appendix-1
An Overview of Nepalese Stock Market

Background

Nepalese stock market has witnessed a major transformation and structural change during the past one-decade or so as a result of on-going financial sector reforms initiated by the Government of Nepal (GoN) since 1990 in the wake of policies of liberalization and globalization. Still a lot to do in this regard, the primary objective of these reforms have been to improve market efficiency, enhancing transparency, checking unfair trade practices, and bringing the Nepalese capital market up to international standards.

Historically, securities market in Nepal began with the floatation of shares by Nepal Bank Limited (a commercial bank) and Biratnagar Jute Mill in the year 1937. The next significant development after this was the introduction of the 'Companies Act' in 1964 and issuance of government bonds in the same year. Real market activity and institutionalized effort, however, did not commence until the establishment of the Securities Exchange Center (SEC) in 1976 with the objective of facilitating and promoting the growth of the capital markets in Nepal.

The Securities Exchange Center was owned 51 percent by the Nepal Industrial Development Corporation (NIDC) and 49 percent by Nepal Rastra Bank (NRB) and operated with a capital of Rs.1.0 million. At this time, there were less than 3,000 shareholders in Nepal and there were very few publicly traded companies. In an effort to increase public awareness and public ownership of shares, the government set aside 30 to 35 percent of all newly created government-owned companies to be sold to the public. At a later stage, the GoN began to sell government bonds on the SEC –which had predominantly held by the NRB up until this point. As a result of the pro-active advertising campaign by the SEC, the public increasingly began to purchase government bonds such that, by 1988, 70 percent were held by the general public. The SEC also began to manage other public issues. All trading was done at and by the SEC.

Stock market in Nepal got its present structure in 1993 when SEC was converted into Nepal Stock Exchange (NEPSE) and establishment of the Securities Board, Nepal (SEBO/N) as sole regulatory and supervisory body in capital market in Nepal with the amendment in the Securities Exchange Act, 1983. Before this enactment, SEC functioned as primary and secondary market and was to play both the role of regulatory body. Recently a new Act has been promulgated-namely the "Securities Act, 2006" effective from September 23, 2005- to integrate and reform the laws relating to securities.

Securities Board, Nepal is an apex body in regulating and supervising the securities market in Nepal. The Act has entrusted rights to issue license to stock exchange, register securities, approve new issue, license securities business person, monitor securities market and ensure the protection of interest of the investors. Before the establishment of the SEBO/N, Securities Exchange Center was the regulator, supervisor and secondary market operator. In the same year, Securities Exchange Center was converted into Nepal Stock Exchange and opened its trading floor on 13th January 1994 for newly appointed brokers and market makers.

SEBO/N is governed by its board consisting of seven members including government appointed chainman and members representing Ministry of Finance, Ministry of Law, Justice, and parliamentary Affairs, Nepal Rastra Bank, Federation of Nepalese Chambers of Commerce and Industry, and Nepal Chartered Accounts Association. It is an autonomous body and directly reports to Ministry of Finance. As a regulator, it has the right to license the stock exchanges, securities businessperson, and investment funds operators. It also has the right to inspect and supervise these institutions and issue directives to safeguard the interest of the investors, maintain stability in the market and prevent fraud and malpractices in the market. Both off-site inspection through the financial information submitted by the participants in the securities market and on-site supervision is conducted by SEBO/N or its appointee at any time. The major source of the income of SEBO/N comes from government and registration fees, licensing fees and grants and donations.

The active members in the securities market in Nepal are securities businesspersons who carry out the securities business and facilitate the proper functioning of the market. The "Securities Act, 2006" has classified such businesses as securities brokering, securities dealing, securities issue management, investment management, investment advisory services, collective investment fund management, securities registration or central depository services or custodial services, services relating to settlement of securities transaction and other services related to securities transaction as specified by the board. The jurisdiction of different types of securities businessperson for operating securities business has been specified in "Securities Businesspersons and Their Authorized Representatives Regulation-2005".

The regulation has allowed stockbrokers to buy and sell securities for their customers, not for their own accounts. However, securities dealers can buy or sell for the customers and for their own account maintaining separate accounts of dealing in each. Securities businesspersons in management of issuance of securities are qualified for managing primary as well as secondary issuance of securities, assisting in preparation of prospectus, scrutinizing the documents and details to be presented in the prospectus and issuance of due diligence certificate in the securities for which issue management is undertaken. The securities businessperson conducting the investment management receives deposits for the investment in the securities by managing portfolio of different financial assets. They also distribute profits from investments and maintain separate accounts for each client. An investment advisory services businessperson counsels to their client on buying, selling, exchanging of different kind of securities and facilitate to make investment decisions without taking possession of clients funds or security in their custody. Securities businesspersons performing the collective investment fund management supervise and manage different investment schemes or unit trusts. They direct the investment of funds and sale of securities but do not take physical custody of any securities or client funds. Finally, securities businessperson working as central depository or share registrar or custodian services acts as transfer registrar of the securities or the custodian of the securities on behalf of the clients.

Development and growth of securities market in Nepal

The overall growth pattern and present position of securities market in Nepal has been presented in Table 1-A. Perusal of this table would point out that over the period 1995 through 2007, the Nepalese securities market has considerably broadened in terms of turnovers, transactions, share listing, market capitalization and paid-up values. The trading turnover has increased from Rs.1054.3 million (0.5 percent of GDP) in FY 1994/95 to Rs.8360 million (1.2 percent of GDP) in FY 2006/07. The market capitalization based on market price of listed shares recorded Rs. 12963.0 million (6.2 percent of GDP) in FY 1994/95 reached to Rs.150664.7 million in FY 2006/07 constituting 25.9 percent of GDP. Although the ratio of market capitalization to GDP reached about 26 percent, the ratio of trading turnover to market capitalization and GDP is 4 percent and less than 1 percent respectively. It indicates the small size of market and low liquidity in the Nepalese stock market.

In the mean time, Nepal Stock Exchange classified listed companies in to 'A' group and others group. The criteria to be classified as 'A" group companies are: (1) the paid up capital of at least Rs.20 million, (2) number of equity shareholders of at least 1,000, (3) profit earnings record of at least three years, (4) book value not less than paid up value, and (5) submission of the financial statements within six months from closure of the fiscal years. The number of 'A' group companies increased from 48 in FY 2004/05 to 66 in FY 2006/07 indicating the increased number of listed companies meeting the criteria. Number of listed companies which were 79 in FY 1994/95 reached to 125 in FY 2004/05, 135 in FY 2005/06 and 135 in FY 2006/07. During FY 2006/07 NEPSE de-listed 12 companies, thus, the number of listed companies declined from 147 to 135.

The composition of trading turnover shows that listed companies of commercial bank group is dominating (72 percent) other groups (Table 1-B). The next emerging group in stock market is hydropower (8.9 percent) followed by finance companies (7.9 percent) and development banks (7.8 percent). Thus, the trading structure indicates that Nepalese stock market is purely dominated by financial sector. The share of manufacturing sector that was 13.1 percent in FY 1994/95 drastically reduced to 0.32 percent implying poor performance of real sector in the economy.

Table 1-A

Growth of major indicators in Nepalese stock market

Indicators of security market	Unit	FY 1994/95	FY 2004/05	FY 2005/06	FY 2006/07
1. Trading turnover	Mlns Rs.	1054.3	4506.8	3451.4	8360
2. (a) Ratio of turnover to total market capitalization	Percent	8.0	7.35	3.57	4.5
(b) Ratio of turnover to GDP	Percent	0.5	0.9	0.6	1.2
3. Number of transactions	Unit	21472	106246	97374	120510
4. Number of companies traded	Unit	53	102	110	116
5. No. of shares traded	'000 Rs.	3900.7	18433.5	12221.9	18147
6. No. of listed companies	Units	79	125	135	135
6.1 No. of listed companies in 'A' group	Units	-	48	56	66
7. Market capitalization of listed companies	Mlns Rs.	12963.0	61365.8	96763.7	186301.2
7.1 Market capitalization of 'A' group companies	Mlns Rs.	-	45347.9	73482.6	150664.7
8. Ratio of market capitalization to GDP	Percent	6.2	12.06	17.35	25.9
9. Paid-up value of listed shares	Mlns Rs.	2971.8	16771.0	19958	21746.4
9.1 Paid-up value of 'A' group companies	Mlns Rs.	-	7246.1	9001.7	11816.9
10. NEPSE Index					
(a) Closing	Points	195.48	286.67	386.83	683.95
(b) High	Points	193.48	298.78	388.49	683.95

Table 1-B

Composition of trading turnover value (in percent)

SN	Groups	1994/95	2004/05	2006/07
1	Commercial banks	74.6	89.2	72.0
2	Development banks	-	0.5	7.8
3	Financial companies	7.6 fin.& ins.	4.8	7.9
4	Insurance companies	7.6 fin. & ins.	1.5	3.0
5	Manufacturing	13.1	2.6	0.32
6	Hotel	2.4	0.1	0.04
7	Trading	1.4	0.2	0.07
8	Other (hydropower)	0.9	1.2	8.9
	Total	100.0	100.0	100.0

The composition of listed companies also reveals the fact that the dominance of manufacturing sector is reducing and financial sector is growing (Table 1-C). The manufacturing sector companies that were 41.8 percent of total listed companies in FY 1994/95 reduced to 16.0 percent in FY 2006/07. On the other hand, the financial sector (that constitutes commercial banks, development banks, finance companies and insurance companies) has been growing drastically from 42 percent to 72 percent during the same period.

Table 1-C

Composition of listed companies in number and percent

S.N.	Groups	1994/95	2004/05	2006/07	1994/95	2004/05	2006/07
1	Commercial banks	6	14	15	7.6	11.2	11.5
2	Development banks	-	7	16	-	5.6	9.9
3	Financial companies	14 fin.& ins.	44	53	17.7	35.2	39.7
4	Insurance companies	14 fin.& ins.	14	16	17.7	11.2	12.2
5	Manufacturing	33	29	21	41.8	23.2	16.0
6	Hotel	2	4	4	2.5	3.2	3.0
7	Trading	21	8	5	26.6	6.4	3.8
8	Other (hydropower)	3	5	6	3.8	4.0	4.5
	Total	79	125	135	100.0	100.0	100.0

The status of major financial products in the secondary market indicates that Nepalese securities market is equity dominated (Table 1-D). There are 135 companies those listed shares Nepal Stock Exchange up to mid-April 2007. The other financial products listed in the stock exchange are preference shares of 4 companies, rights of 47 companies, bonus shares of 53 companies, corporate debentures of 6 companies, mutual fund of one company and bonds of Government of Nepal.

Table 1-D

Status of major financial products in the secondary market in Nepal

Listed financial products	Beginning year (esp. after 1990)	Value of listed products up to mid-July 2007	No. of issuing companies up to mid-July 2007	Status of Transaction
Ordinary shares	1993	Rs. 21.47 billions	135	Dynamic
Preference shares	1991	Rs.353 millions	4	Low
Rights	1994	Converted into ordinary shares	47	Dynamic
Bonus	1993	Converted into ordinary shares	53	Dynamic
Corporate debentures	2003	Rs. 1.71 billions	6	Very low
Mutual fund	1994	Rs. 100 millions	1	Negligible
Government bond	2005	Rs. 7.05 billions	GoN	Negligible

Trading mechanism and price formation

NEPSE's trading was automated through computerized trading system with the assistance of British company named Comdaq Limited since 24 August 2007. This system is in consistent with Securities Act, 2006 and comply the norms of international practices and values in securities transactions. It replaces the old “Open Cry Out" system under which securities transactions were undertaken in open auction in the trading floor. The automation led Nepal Stock Exchange in to era of modernization.

The modernization of NEPSE also includes on-line trading from broker's office to NEPSE or trading of securities through broker's office based on wide area network (WAN) that was started since mid-September, 2007. Under this system, investors while making orders to buy or sell securities should fill up the order form in computers providing details of their names, address, father’s name, grandfather’s name, identity number and the like. All the orders are to registered chronologically and click on 'buy' or 'sell' buttons in computer according to the type of order.

The investor can post the orders mentioning three types of prices: specified price, limit price or market price. The broker should take into consideration about the changes in prices while specifying the prices and limits. As per Stock Exchange rules opening prices cannot be more or less than 5 percent of the previous days closing price but, once transactions are concluded within this range, the price is permitted to change within a limit of 2 percent on each consecutive transaction. In case of bond and debentures, the limit is 0.2 percent for the first transaction and 0.1 percent from one trade to another trade. The trading can be executed off-floor for large block of trades over 5 percent of nominal value of company's shares and details regarding the trade should be reported to NEPSE.

There are three stages in the implementation of the buy sell order by brokers in Stock Exchange. At the opening (ATO), the Stock Exchange provides half-an-hour time (from 11:30 AM to 11:59 AM) to submit details of orders. The trading engine starts trading after 12:00 noon according to the price-time priority. If the Stock Exchange has specified the number of transactions or times at the end, the closing price will be the average price and if brokers orders at the close (ATC), this price would be the closing price.

The brokers have options to order to retain at the end of the day (EOD) or good-till cancelled (GTC). As per the rules of Exchange, if time is not specified to retain the orders in the order form, such orders will be valid for 15 days.

The conditions of the transactions as per the new automated systems are to specify no condition or to implement the order immediately or cancel it (Immediate or cancel-IOC) or fill or kill (FOK) or all or none (AON). The orders, which are not implemented under AON, will be maintained under public order book or pending order book.

The Exchange operates with a T+3 system for equities and T+0 system for bonds and debentures such that the settlement of transaction should be concluded within 3 working days of the transaction day and within the transaction day for equities and bonds respectively. The trading day of the brokers is T + 0 day. The buying broker should deposit the contractual amount along with NEPSE commission, tax on brokerage commission (TDS) in T+1 day in Exchange. If the broker failed to deposit such an amount he/she will not be allowed to make transaction in T+2 day. In T+2 days the brokers should submit all the required documents and share certificate to the

Stock Exchange. The brokers may submit these documents in T+3 days but not allowed to participate in transactions. If the required documents are not submitted in the T+4 days the transaction will be cancelled.

The process of transferring ownership is complex and time consuming in Nepal. The board of directors meeting should approve each transfer. Companies require two directors to endorse every transfer. In case, the board meeting is not held in time, it may take a month or two month to make transfer the share. To avoid such difficulties, a process called "blank transfer" has been introduced in trading mechanism in NEPSE. This mechanism allows investors to buy and sell shares without owning certificates and transfer deed may be endorsed on the back. Those wishing to receive dividends or voting rights send the transfer deed in front of the company. Those brokers who are willing to blank transfers or name transfers, they should complete it within T+5 days.

Along with these mechanisms and developments, Nepal Stock Exchange has started other reform initiatives to modernize the securities market in Nepal. The automation has paved the way to open entry and exit to the brokers in investment industry. The real time information (live) on trading activities has also been started to disseminate through NEPSE website since mid-October 2007. Similarly, the historic event of secondary market transactions of government bonds in the floors of Exchange has been initiated since December 15, 2006. The trading hours in NEPSE has been increased by 50 percent to 3 hours. The system of trading halt of market is started and circuit breaker was introduced effectively from August 2, 2006. Further, the system of matching transaction was abolished since August 2, 2006. The new sensitive index of 'A' class-listed companies was constructed and released from January 2007.

However, Nepalese stock market faces so many problems resulting in a poor performance. The most important factor impeding the development of the NEPSE is poor accounting standards. Weak auditing and accounting standards mean that many companies' financial statements are not credible. In fact, some companies which are currently listed on the NEPSE have not produced accounts for several years. Even when accounts are prepared, they are frequently of poor quality as to be an ineffective guide as to the true financial health of the company.

The listing requirements are also weak meaning that almost any company can be listed on the exchange by providing some accounting information. In the tradition of many South Asian companies, many firms in Nepal are family owned and operated. Often inexperienced family members operate as managers, accountants, and hold other senior management positions.

Preponderance of investment in banking stocks and poor business environment are other impediments in the development of NEPSE as a reasonable stock exchange. In addition, absence of central depository mechanism, credit rating agencies, automation of NEPSE trading are other institutional and legal lacking behind the poor performance of stock market in Nepal.

To sum, Nepalese stock market is still in growing stage. Though some reform measures are initiated, it is not sufficient to modernize the stock market in Nepal to address the issue of liberalization and globalization. A bunch of inadequacies and lacking are to be improved and legal and institutional mechanisms are to be developed to make more transparent, efficient, liquid and functioning stock market in Nepal.

Appendix-2

Profiles of selected companies

(2004/05)

SN	Company	Capital (Rs. in million)	No.of shares outstanding	Closing price (Rs.)	MKT Cap	Traded shares('000)	No of transaction
1	ACEFIN	90.0	900000	251.0	225.90	25.99	119
2	ANPF	20.0	200000	431.0	86.20	5.61	117
3	BBC	37.30	373000	1930.0	719.89	4.57	28
4	BOK	463.58	4635809	430.0	1993.40	666.70	3210
5	CIT	40.0	400000	200.0	80.0	1.65	81
6	EBL	315.0	3150000	870.0	2740.50	163.20	2126
7	EICL	30.0	300000	325.0	97.50	25.37	71
8	GRUL	287.51	3833400	50.0	191.67	5.15	46
9	HBTF	18.65	1865000	1.60	2.98	6653	12
10	HBL	525.20	5250000	920.0	4830.0	106.40	1249
11	HGIC	30.0	300000	205.0	61.50	2.85	62
12	KFL	30.0	300000	138.0	41.40	12.33	126
13	NABIL	491.0	4909950	1505.0	7389.47	169.50	1441
14	NFCL	42.0	420000	295.0	123.90	8.66	50
15	NEIL	50.0	500000	110.0	55.0	3.54	94
16	NBBL	360.0	3600000	265.0	954.0	316.80	2489
17	NFSC	20.0	200000	147.0	29.40	8.01	82
18	NHDFC	36.37	363675	185.0	67.28	20.25	202
19	NICL	79.0	789987	370.0	292.30	8.66	72
20	NIBL	295.29	2952930	800.0	2362.34	127.70	1392
21	SBI	431.65	4316544	335.0	1446.04	161.0	1233
22	NCML	60.0	600000	145.0	87.0	36.97	152
23	PFL	42.63	426255	100.0	42.63	69.86	103
24	PICL	30.0	300000	210.0	63.0	2.31	92
25	SHL	86.97	8697187	50.0	434.86	6.14	12
26	SCBL	374.64	3746404	2345.0	8785.32	1319.0	1496
27	TRHL	744.99	7449875	40.0	298.0	14.70	194
28	ULL	121.0	1210000	1631.0	1973.51	7.14	91

29	UICL	60.0	600000	128.0	76.80	32.50	122
30	UFCML	37.50	375000	130.0	48.75	6.81	83

Appendix-3

Number and types of securities businesspersons in Nepal Stock Exchange Ltd.

Fiscal Year	Security Broker	Issue Manager	Market Maker	Security Dealers	Total
1993/94	25	-	5	-	30
1994/95	31	-	6	-	37
1995/96	31	-	6	-	37
1996/97	30	11	6	4	49
1997/98	28	11	4	4	46
1998/99	28	10	3	2	42
1999/00	27	10	2	2	41
2000/01	27	10	3	2	40
2001/02	27	10	1	2	39
2002/03	27	7	-	2	36
2003/04	27	7	-	2	36
2004/05	27	7	-	2	36
2005/06	24	7	-	2	33

Source: Security Board/ Nepal

Appendix-4

Resource mobilization by different sectors of listed companies (1993/94-2004/05)

S.N.	Sectors	Numbers	Capital Raised (Rs. in Mil.)	Percentage
1	Commercial Banks	24	4406.91	51
2	Development Banks	8	206.78	3
3	Finance Companies	68	1896.35	22
4	Insurance Companies	12	280.20	3
5	Hotels	3	350.00	4
6	Manufacturing and Processing	20	902.34	11

7	Trading	1	3.01	0
8	Others	6	519.41	6
	Total	142	8565.00	100

Source: Security Board/ Nepal

Appendix-5

Issue approval by SEBO/N (instrument-wise)

Fiscal Year	Equity Share	Rights Share	Preference Share	Debentures	Mutual/Unit Fund	Total
1993/94	227.90	-	16.50	-	100.00	344.40
1994/95	204.21	-	-	-	50.00	254.21
1995/96	224.74	69.00	-	-	-	293.74
1996/97	57.00	275.20	-	-	-	332.20
1997/98	119.40	249.96	-	93.00	-	462.36
1998/99	148.00	30.00	80.00	-	-	258.00
1999/00	412.46	124.60	-	-	-	537.06
2000/01	268.50	365.79	-	-	-	634.29
2001/02	528.76	387.87	140.00	360.00	-	1416.63
2002/03	551.5	162.20	-	-	-	713.70
2003/04	755.0	429.90	-	300.00	-	1484.90
2004/05	300.89	679.42	-	300.00	-	1280.31
Total	3798.36	2773.94	236.50	1053.00	150.00	8011.80

Appendix-6

Instruments used in raising funds by Nepalese listed companies

Instrument	Number	Capital Raised	Percentage
Equity Shares	98	3861.23	45
Right Share	33	2764.00	32
Preference Share	4	236.50	3
Debenture	4	1053.00	12
Mutual/Unit Fund	3	650.00	8
Total		8565.00	100

Appendix-7

Number of listed companies by the end of FY 2004/05 in NEPSE

S.N.	Sector	Number of Listed Companies	Percent

1	Commercial Bank	14	11.20
2	Development Bank	7	5.6
3	Finance Company	44	35.20
4	Insurance Company	14	11.20
5	Hotel	4	3.20
6	Manufacturing and Processing	29	23.20
7	Trading Company	8	6.40
8	Other Company	5	4.00
	Total	125	100.00

Appendix-8

Number of listed companies (FY 1993/94 to 2004/05) in NEPSE

Year	Number of Listed Companies
1993/94	66
1994/95	79
1995/96	89
1996/97	95
1997/98	101
1998/99	107
1999/00	110
2000/01	115
2001/02	96
2002/03	108
2003/04	114
2004/05	125

Appendix-9

Market capitalization and paid-up value of the listed securities in NEPSE (FY2004/05)

S.N.	Sector	Paid-Up Value	Percent	Market Capitalization	Percent
1	Commercial Bank	6987.34	41.66	40119.88	65.38

2	Development Bank	669.48	3.99	1050.07	1.71
3	Finance Company	2009.89	11.98	3666.13	5.97
4	Insurance Company	1228.00	7.32	3966.10	6.46
5	Hotel	1552.88	9.26	2308.38	3.76
6	Manufacturing and Processing	2756.96	16.44	5024.83	8.19
7	Trading Company	76.64	0.46	635.88	11.04
8	Other Company	1490.66	8.89	4594.62	7.49
	Total	16771.85	100.00	61365.89	100.00

Appendix-10

Market capitalization and paid-up value of the listed securities in NEPSE (1993/94 -2004/05)

S.N.	Year	Paid-up Value	Market capitalization
1	1993/94	2182.20	13872.0
2	1994/95	2961.80	12963.0
3	1995/96	3358.50	12295.0
4	1996/97	4476.50	12698.0
5	1997/98	4959.80	14289.0
6	1998/99	6487.40	23508.0
7	1999/00	7347.40	43123.0
8	2000/01	8165.20	46349.4
9	2001/02	9685.0	34703.9
10	2002/03	12560.10	34240.4
11	2003/04	13404.90	41424.3
12	2004/05	16771.90	61365.9

Appendix-11

Annual turnover of NEPSE by different sectors (FY 2004/05)

S.N.	Sector	Trading Amount	Percent
1	Commercial Bank	4021.83	89.23
2	Development Bank	22.01	0.48
3	Finance Company	216.37	4.80
4	Insurance Company	67.62	1.50
5	Hotel	4.48	0.10
6	Manufacturing and Processing	114.90	2.55
7	Trading Company	7.99	0.18

8	Other Company	52.48	1.16
	Total	4507.68	100.00

Appendix-12

Annual turnover of NEPSE (1993/94-2004/05)

S.N.	Year	Annual Turnover
1	1993/94	441.6
2	1994/95	1054.3
3	1995/96	215.6
4	1996/97	416.2
5	1997/98	202.6
6	1998/99	1500.0
7	1999/00	1157.0
8	2000/01	2344.2
9	2001/02	1540.6
10	2002/03	575.8
11	2003/04	2144.3
12	2004/05	4507.7

Appendix-13

Year-end NEPSE index (FY 1993/94-2004/05)

S.N.	Year	NEPSE Index
1	1993/94	226.03
2	1994/95	195.48
3	1995/96	185.61
4	1996/97	176.31
5	1997/98	163.35
6	1998/99	216.92
7	1999/00	360.70
8	2000/01	348.43
9	2001/02	227.54
10	2002/03	204.86

11	2003/04	222.04
12	2004/05	286.87

Appendix-14

Kolmogorov-Smirnov (K-S) goodness of fit test

K-S test, being a non-parametric test, further confirms whether the return series of both the market and individual stocks follow normal distribution. The results of K-S test of the daily, weekly and monthly return series of both market and individual stocks are shown in Table 14-A. The K-S z-values for daily and weekly market return series are significant (for these series probability is 0.0 for the Z) clearly indicate that the frequency distribution of the daily and weekly price indices of Nepal Stock Exchange does not fit by normal distribution. However, monthly market return series confirm normality for all level of significance using this test.

The daily and weekly return series of individual stocks shows similar results to the market returns. As shown in Table 14-A, all selected individual companies' return series (daily and weekly) have K-S Z-values that are significant at all levels.

The table shows that the maximum absolute difference in frequencies of observed and theoretical distribution of daily market returns is 0.19 percent. However, the extreme positive and negative differences are 0.18 percent and –0.02 percent. The K-S z-statistic is 9.08 which is significant at 5 percent. Thus, the null hypothesis that daily market returns are normally distributed is rejected. Similarly, the weekly market returns are not normally distributed, as K-S z-statistic for these returns is 3.14 and significant at 5 percent. However, there is no statistical reason to reject the null hypothesis that monthly market returns fit to normal distribution. The K-S z-statistic is 0.95, which is not significant at 5 percent.

The table further reveals that highest and lowest absolute differences between observed and theoretical frequencies are reported for daily (0.19 percent) and monthly market returns (0.09 percent) respectively. The highest extreme positive value (0.18 percent) is observed for daily returns and highest extreme negative value (-0.14 percent) is reported for weekly market returns. Thus, K-S test implies that daily and weekly market returns do not fit normal distribution. The monthly returns fit to normal distribution. The result is not consistent with the Jarque-Bera (JB) test which confirms all three returns series far from normal distribution. However, there is a similarity between the coefficients of both the test. The JB value and K-S values are gradually declining from high frequency (daily) return to low frequency (monthly) return.

Table 14-A

Kolmogorov –Smirnov test

The data for this table are from the Nepal Stock Exchange Limited files for the period 1995-2005 and individual companies. The Kolmogorov-Smirnov (K-S) test is used to decide if series comes from normal distribution. It is based on the empirical distribution function (ECDF). Given N ordered data points Y1, Y2…..,YN, the ECDF is defined as E (n) = n(i)/n where, n(i) is the number of points less than Yi and Yi are ordered from smallest to largest values. Parameters (mean and standard deviation) of the theoretical distributions are estimated from the observed data. Absolute indicates the largest absolute difference between the theoretical cumulative distribution and the observed cumulative distribution function. Large significance value (p-value > 0.05) indicates that the observed distribution corresponds to the theoretical distribution.

SN	Company	Return series	N	Mean (%)	Absolute	Positive	Negative	K-S Z
1	NEPSE	Daily	2344	0.0186	0.187	0.176	-0.0187	9.075***
		Weekly	508	0.1331	0.139	0.122	-0.139	3.137***
		Monthly	120	0.5684	0.087	0.051	-0.087	0.949
2	ACEFIN	Daily	474	0.3446	0.267	0.203	-0.267	5.817***
		Weekly	204	0.8007	0.199	0.155	-0.199	2.848***
		Monthly	103	1.585	0.165	0.124	-0.165	1.678***
3	ANPF	Daily	375	0.2305	0.28	0.157	-0.28	5.428***
		Weekly	176	1.118	0.239	0.095	-0.239	2.084***
		Monthly	120	0.7203	0.249	0.181	-0.249	2.733***
4	BBC	Daily	332	0.0537	0.207	0.161	-0.207	3.769***
		Weekly	159	0.1122	0.16	0.095	0.16	2.022***
		Monthly	120	0.0497	0.229	0.176	-0.229	2.508***
5	BOK	Daily	1343	0.0382	0.153	0.147	-0.153	5.604***
		Weekly	409	0.2581	0.13	0.12	-0.13	2.633***
		Monthly	96	1.09	0.104	0.085	-0.104	10.23

6	CIT	Daily	639	0.1814	0.275	0.248	-0.275	6.944***
		Weekly	291	0.399	0.237	0.128	-0.237	4.041***
		Monthly	112	1.235	0.185	0.128	-0.185	1.956***
7	EBL	Daily	1894	0.1099	0.19	0.171	-0.19	8.269***
		Weekly	466	0.4465	0.143	0.134	-0.143	3.094***
		Monthly	111	2.052	0.097	0.097	-0.062	1.018
8	EICL	Daily	1014	0.105	0.272	0.209	-0.272	8.683***
		Weekly	363	0.2933	0.252	0.153	-0.252	4.793***
		Monthly	119	0.833	0.177	0.126	-0.177	1.931***
9	GRUL	Daily	516	-0.092	0.245	0.19	-0.245	5.578***
		Weekly	219	-0.226	0.141	0.116	-0.141	2.086***
		Monthly	119	-0.4459	0.164	0.164	-0.163	1.793***

SN	**Company**	**Return series**	**N**	**Mean (%)**	**Absolute**	**Positive**	**Negative**	**K-S Z**
10	HBTF	Daily	593	-0.2365	0.258	0.224	-0.258	6.289***
		Weekly	223	-0.6217	0.204	0.204	-0.181	3.049***
		Monthly	118	-1.16	0.238	0.238	-0.22	2.584***
11	HBL	Daily	1765	0.0347	0.214	0.17	-0.214	8.992***
		Weekly	492	0.1246	0.165	0.128	-0.165	3.667***
		Monthly	120	0.5661	0.141	0.106	-0.141	1.545*
12	HGIC	Daily	431	0.0618	0.245	0.224	-0.245	5.081***
		Weekly	213	0.1251	0.171	0.153	-0.171	2.495***
		Monthly	118	0.2257	0.172	0.172	-0.139	1.873***
13	KFL	Daily	801	0.0996	0.226	0.195	-0.226	6.385***
		Weekly	321	0.2484	0.163	0.149	-0.163	2.921***
		Monthly	119	0.3979	0.184	0.184	-0.125	2.004***
14	NABIL	Daily	2009	0.0553	0.205	0.171	-0.205	9.183***
		Weekly	504	0.2203	0.146	0.129	-0.146	3.286***
		Monthly	121	0.9254	0.155	0.06	-0.155	1.697***
15	NFCL	Daily	441	0.1164	0.207	0.176	-0.207	4.347***
		Weekly	222	0.2313	0.132	0.132	-0.132	1.971***
		Monthly	119	0.4753	0.122	0.086	-0.122	1.328**
16	NEIL	Daily	438	0.074	0.263	0.233	-0.263	5.496***
		Weekly	194	0.167	0.21	0.21	-0.182	2.919***

		Monthly	87	0.2513	0.193	0.193	-0.12	1.802***
17	NBBL	Daily	2066	0.0259	0.167	0.151	-0.167	7.595***
		Weekly	481	0.1113	0.112	0.096	-0.112	2.453***
		Monthly	115	0.4656	0.095	0.054	-0.095	1.018
18	NFSC	Daily	456	0.1373	0.209	0.144	-0.209	4.471***
		Weekly	208	0.301	0.177	0.14	-0.177	2.556***
		Monthly	117	0.6601	0.181	0.181	-0.172	1.954***
19	NHDFC	Daily	758	0.258	0.246	0.237	-0.246	6.775***
		Weekly	316	0.6189	0.187	0.164	-0.187	3.323***
		Monthly	115	1.75	0.142	0.142	-0.102	1.524**
20	NICL	Daily	490	-0.0095	0.244	0.212	-0.244	5.39***
		Weekly	222	-0.021	0.164	0.16	-0.164	2.439***
		Monthly	119	-0.0392	0.16	0.145	-0.16	1.741***

SN	Company	Return series	N	Mean (%)	Absolute	Positive	Negative	K-S Z
21	NIBL	Daily	1490	0.0262	0.232	0.194	-0.232	8.955***
		Weekly	447	0.0875	0.186	0.164	-0.186	3.922***
		Monthly	120	0.3258	0.192	0.104	-0.192	2.108***
22	SBI	Daily	2024	-0.0111	0.221	0.194	-0.221	9.948***
		Weekly	496	-0.0443	0.178	0.141	-0.178	3.956***
		Monthly	120	-0.0938	0.169	0.092	-0.169	1.855***
23	NCML	Daily	651	-0.005	0.209	0.18	-0.209	5.321***
		Weekly	287	-0.0113	0.166	0.102	-0.166	2.815***
		Monthly	120	0.0192	0.136	0.136	-0.124	1.49*
24	PFL	Daily	824	0.024	0.254	0.218	-0.254	7.298***
		Weekly	314	0.0631	0.217	0.217	-0.216	3.848***
		Monthly	119	0.2007	0.216	0.216	-0.194	2.361***
25	PICL	Daily	953	0.0553	0.279	0.236	-0.279	8.62***
		Weekly	354	0.1489	0.214	0.184	-0.214	4.027***
		Monthly	118	0.3503	0.162	0.117	-0.162	1.764***
26	SHL	Daily	487	-0.1218	0.218	0.184	-0.218	4.811***
		Weekly	219	-0.2709	0.157	0.143	-0.157	2.326***
		Monthly	120	0.4724	0.15	0.111	-0.15	1.646***
27	SCBL	Daily	1902	0.0781	0.335	0.313	-0.335	14.607***
		Weekly	474	0.3135	0.177	0.125	-0.177	3.848***
		Monthly	120	1.238	0.16	0.085	-0.016	1.752***
28	TRHL	Daily	603	-0.1678	0.241	0.185	-0.241	5.912***
		Weekly	203	-0.4983	0.172	0.172	-0.163	2.455***
		Monthly	67	-1.68	0.152	0.152	-0.071	1.243**
29	ULL	Daily	713	0.2335	0.247	0.18	-0.247	6.598***
		Weekly	297	0.5606	0.199	0.146	-0.199	3.431***
		Monthly	120	1.387	0.136	0.136	-0.127	1.488*
30	UICL	Daily	897	0.0404	0.219	0.205	-0.219	6.546***
		Weekly	338	0.1071	0.163	0.13	-0.163	2.996***
		Monthly	120	0.2656	0.138	0.138	-0.074	1.509***
31	UFCML	Daily	450	0.2967	0.256	0.249	-0.256	5.429***

	Weekly	198	0.6976	0.174	0.174	-0.164	2.449***
	Monthly	97	1.53	0.154	0.154	-0.127	1.52***

Appendix-15

AAR, CAAR, associated t-statistics and significance (overall sample)

DAY/COM	Day-20	Day-19	Day-18	Day-17	Day-16	Day-15	Day-14	Day-13	Day-12	Day-11
ACEFIN	-0.01	-0.01	0.00	0.04	0.01	-0.02	-0.01	0.01	-0.01	-0.03
BOK1	0.00	0.00	-0.04	0.00	-0.03	0.04	0.03	-0.01	0.00	0.01
BOK2	0.00	0.00	0.00	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	0.00
CIT	-0.04	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.08	0.00
EBL	-0.02	-0.01	-0.01	-0.02	-0.01	-0.01	0.01	0.02	0.03	-0.02
HBL	0.03	-0.03	0.00	0.05	-0.05	-0.01	-0.01	0.03	-0.06	0.08
KFL	0.00	0.01	0.00	-0.02	0.01	0.01	0.01	-0.05	0.00	0.02
NABIL1	0.01	0.00	0.01	0.00	0.04	0.00	0.01	0.01	0.00	0.01
NABIL2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	-0.01	0.00	0.01
NBBL	0.01	-0.01	0.00	-0.02	-0.05	-0.03	-0.08	0.02	0.00	0.00
NCML	-0.03	0.01	-0.02	0.02	0.01	0.04	0.03	0.01	-0.03	-0.02
NFCL	0.01	-0.02	0.06	0.10	0.07	-0.06	0.04	0.06	-0.04	0.01
NFSL	0.02	-0.01	0.07	0.11	0.08	-0.05	0.05	0.06	-0.03	0.01
NHDFC1	0.03	-0.03	0.11	-0.03	-0.09	-0.01	0.00	-0.02	0.00	0.00
NHDFC2	0.05	-0.03	-0.10	0.00	0.09	0.00	0.00	0.00	0.00	0.00
NIBL1	0.01	0.01	0.00	-0.02	-0.05	0.00	0.00	0.00	-0.01	0.00
NIBL2	-0.01	-0.01	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
NMB	0.00	0.03	-0.02	0.00	-0.05	0.00	0.01	0.00	-0.01	-0.01
PFL	0.02	-0.01	0.04	0.04	0.06	0.02	0.04	0.02	-0.01	0.08
SBI1	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.02	0.00	0.00
SBI2	0.00	-0.01	0.01	0.00	-0.01	-0.01	0.03	-0.02	0.01	-0.01
SCBL1	0.00	0.01	0.00	0.01	0.01	0.00	0.00	-0.01	0.00	0.00
SCBL2	-0.01	0.00	0.00	0.02	0.00	0.00	0.00	-0.03	-0.01	-0.01
UFCML	-0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	-0.09	-0.06
UICL1	0.00	0.00	0.01	-0.01	0.00	0.01	0.01	0.00	0.01	0.03
UICL2	0.01	-0.01	-0.03	0.06	-0.01	-0.01	-0.01	-0.01	0.01	-0.02
ULL	0.01	0.01	0.00	0.00	-0.01	0.01	0.00	0.00	-0.01	0.00
UNIFIN	0.00	0.02	0.03	-0.02	-0.01	0.00	0.00	0.07	0.14	0.09
sum	0.08	-0.05	0.13	0.31	0.07	-0.08	0.18	0.16	-0.02	0.15
mean	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
cumulative	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03
t-statistic(ar)	0.84	-0.49	0.65	1.71	0.33	-0.79	1.42	1.17	-0.12	0.91
SD	0.02	0.02	0.04	0.03	0.04	0.02	0.02	0.03	0.04	0.03
STD ERROR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T-statistic(cum)	0.84	-0.69	1.13	3.43	0.73	-1.93	3.75	3.31	-0.35	2.88
t-stat(cum)	0.84	0.52	1.43	5.17	5.57	10.58	13.50	16.12	11.08	17.33
sum	0.08	-0.05	0.13	0.31	0.07	-0.08	0.18	0.16	-0.02	0.15
mean	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01
cumulative	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03
t-statistic(ar)	0.39	-0.23	0.25	1.38	-0.36	-0.80	1.35	0.13	0.33	0.47
SD	0.74	0.81	1.21	1.19	1.65	0.77	1.13	1.14	1.42	1.04

STD ERROR	0.14	0.11	0.13	0.11	0.14	0.06	0.08	0.08	0.09	0.06
T-statistic(cum)	0.39	0.18	0.16	3.26	1.41	-3.86	2.12	4.14	1.30	2.90
AAR (%)	0.3	-0.2	0.5	1.1	0.3	-0.3	0.6	0.6	-0.1	0.6
CAAR(%)	0.3	0.1	0.6	1.7	1.9	1.6	2.3	2.9	2.8	3.3

AAR, CAAR, associated t-statistics and significance (overall sample)

DAY/COM	Day-10	Day-9	Day-8	Day-7	Day-6	Day-5	Day-4	Day-3	Day-2	Day-1	Day-0
ACEFIN	-0.03	-0.01	-0.02	0.00	0.01	0.02	0.00	-0.01	-0.01	0.02	0.01
BOK1	0.00	0.00	0.00	-0.01	0.00	0.01	-0.01	0.01	0.02	0.00	0.00
BOK2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	-0.01	-0.01
CIT	0.01	0.00	0.00	0.00	0.04	0.00	-0.01	0.05	0.00	0.05	0.01
EBL	-0.02	-0.01	0.00	0.04	-0.01	-0.01	0.00	-0.02	-0.01	0.00	-0.02
HBL	-0.05	-0.01	0.03	0.02	-0.03	-0.02	0.00	0.02	-0.01	0.01	0.08
KFL	0.01	0.01	0.00	-0.03	-0.02	-0.02	0.01	0.03	0.01	-0.01	0.00
NABIL1	0.00	0.01	0.01	0.00	-0.01	-0.01	0.00	-0.02	-0.01	-0.01	0.01
NABIL2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	-0.01	0.00	0.00	0.00
NBBL	0.00	0.00	0.04	0.02	0.03	0.01	0.04	0.02	0.01	0.01	-0.01
NCML	0.01	-0.03	0.02	0.01	0.01	0.01	0.05	-0.02	0.00	0.00	0.09
NFCL	-0.01	0.00	-0.05	-0.05	0.03	0.04	-0.03	-0.01	-0.05	0.02	0.01
NFSL	0.00	0.00	-0.03	-0.05	0.04	0.05	-0.02	-0.01	-0.05	0.03	0.02
NHDFC1	0.00	0.00	0.00	0.08	-0.09	0.02	0.00	0.07	0.07	0.10	0.04
NHDFC2	0.00	-0.01	0.00	0.00	-0.01	0.03	-0.03	0.01	0.00	0.01	-0.02
NIBL1	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.01	-0.01	-0.01	-0.01
NIBL2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	-0.03
NMB	-0.03	0.00	0.00	-0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00
PFL	-0.02	-0.04	0.02	0.06	0.00	0.00	-0.05	0.01	0.00	0.00	-0.03
SBI1	0.00	-0.07	0.03	-0.10	-0.03	-0.06	0.01	0.01	-0.02	0.00	0.01
SBI2	-0.01	0.01	-0.01	0.01	0.01	0.00	0.00	0.01	0.00	-0.01	0.00
SCBL1	0.00	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01
SCBL2	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01	0.02
UFCML	0.06	0.00	-0.06	0.00	0.01	0.05	0.00	-0.03	0.03	-0.06	0.00
UICL1	0.01	0.03	0.00	-0.04	0.00	0.00	0.00	-0.01	0.00	-0.11	0.05
UICL2	-0.01	0.04	0.05	0.00	-0.19	0.06	0.05	-0.04	0.00	0.03	0.03
ULL	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	0.05
UNIFIN	0.00	-0.10	-0.05	0.00	-0.01	0.02	-0.01	0.00	0.01	0.02	0.00
sum	-0.08	-0.17	-0.02	-0.07	-0.19	0.27	-0.01	0.09	0.03	0.08	0.31
mean	0.00	-0.01	0.00	0.00	-0.01	0.01	0.00	0.00	0.00	0.00	0.01
cumulative	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.03	0.03	0.03	0.04
t-statistic(ar)	-0.79	-1.24	-0.13	-0.40	-0.84	1.98	-0.05	0.70	0.28	0.44	2.04
SD	0.02	0.03	0.03	0.03	0.04	0.03	0.02	0.02	0.02	0.03	0.03
STD ERROR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T-statistic(cum)	-2.61	-4.29	-0.49	-1.51	-3.26	7.94	-0.20	2.99	1.23	1.95	9.34
t-stat(cum)	27.72	17.00	17.33	12.75	6.74	19.79	24.50	25.29	27.76	21.62	35.34
sum	-0.08	-0.17	-0.02	-0.07	-0.19	0.27	-0.01	0.09	0.03	0.08	0.31
mean	0.00	-0.01	0.00	0.00	-0.01	0.01	0.00	0.00	0.00	0.00	0.01

cumulative	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.03	0.03	0.03	0.04
t-statistic(ar)	-1.14	-0.76	0.32	-0.63	-0.86	1.32	0.53	0.44	0.42	0.07	1.66
SD	0.71	1.12	0.99	1.50	1.90	1.21	0.71	1.04	0.94	1.42	1.17
STD ERROR	0.04	0.06	0.05	0.08	0.09	0.06	0.03	0.05	0.04	0.06	0.05
T-statistic(cum)	-1.48	-5.15	-1.96	-1.56	-5.27	-0.17	11.42	3.38	3.95	1.56	8.00
AAR (%)	-0.3	-0.6	-0.1	-0.2	-0.7	1.0	0.0	0.3	0.1	0.3	1.1
CAAR(%)	3.0	2.4	2.4	2.1	1.4	2.4	2.4	2.7	2.8	3.1	4.2

AAR, CAAR, associated t-statistics and significance (overall sample)

DAY/COM	Day+1	Day+2	Day+3	Day+4	Day+5	Day+6	Day+7	Day+8	Day+9	Day+10
ACEFIN	0.08	0.08	0.08	-0.23	0.08	0.09	-0.10	0.09	-0.01	-0.04
BOK1	-0.03	-0.08	0.02	-0.02	0.01	0.01	0.01	0.01	0.01	-0.01
BOK2	-0.01	0.00	0.00	-0.02	0.00	0.00	0.01	0.00	0.00	0.00
CIT	0.00	-0.02	-0.02	0.00	0.00	0.00	0.00	0.05	-0.03	-0.02
EBL	0.00	-0.01	0.03	-0.01	-0.02	0.01	0.00	-0.01	-0.01	-0.01
HBL	-0.09	-0.01	0.00	0.00	-0.01	-0.03	0.01	0.04	-0.05	0.00
KFL	0.00	0.01	0.00	-0.04	0.00	-0.06	-0.04	0.04	0.05	-0.04
NABIL1	0.00	0.03	-0.02	0.00	0.01	0.01	0.03	0.01	0.02	0.00
NABIL2	0.02	0.04	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
NBBL	0.00	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.04
NCML	-0.03	-0.60	0.00	-0.12	-0.02	0.00	0.00	0.00	-0.02	0.00
NFCL	0.06	0.03	0.01	-0.01	0.12	-0.01	0.07	0.00	-0.13	0.00
NFSL	0.07	0.03	0.01	0.00	0.13	-0.01	0.07	-0.02	-0.14	0.02
NHDFC1	-0.14	0.00	0.00	0.00	0.03	0.04	-0.08	0.01	-0.02	-0.01
NHDFC2	-0.01	0.00	0.00	0.00	0.00	-0.07	-0.06	0.00	0.00	0.00
NIBL1	0.01	0.00	-0.02	0.00	-0.01	-0.01	-0.04	-0.02	0.03	0.00
NIBL2	-0.03	-0.02	0.01	0.00	-0.02	-0.01	0.01	-0.01	0.00	0.00
NMB	0.00	0.01	-0.04	0.00	-0.06	0.02	0.01	0.00	0.02	0.03
PFL	0.06	-0.02	0.02	0.02	0.01	-0.01	0.05	0.02	0.01	0.03
SBI1	0.01	0.05	-0.04	-0.03	-0.09	-0.02	-0.01	0.00	0.03	0.00
SBI2	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00
SCBL1	0.02	0.00	0.00	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00
SCBL2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
UFCML	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.00	0.00
UICL1	0.00	0.00	0.09	0.02	-0.06	-0.04	0.00	0.02	0.00	0.01
UICL2	-0.01	0.00	0.01	0.07	-0.06	0.04	0.08	0.00	-0.01	0.03
ULL	0.04	0.05	0.00	0.03	0.06	0.02	0.00	0.00	-0.21	0.04
UNIFIN	0.00	-0.02	0.03	0.01	-0.07	0.02	0.00	0.00	-0.02	-0.01
sum	0.03	-0.48	0.18	-0.35	0.05	-0.04	0.01	0.26	-0.48	0.07
mean	0.00	-0.02	0.01	-0.01	0.00	0.00	0.00	0.01	-0.02	0.00
cumulative	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.01	0.01
t-statistic(ar)	0.11	-0.76	1.23	-1.29	0.18	-0.23	0.03	2.18	-1.66	0.61
SD	0.04	0.12	0.03	0.05	0.05	0.03	0.04	0.02	0.05	0.02
STD ERROR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T-statistic(cum)	0.54	-3.59	6.05	-6.43	0.93	-1.18	0.15	11.73	-9.11	3.40

t-stat(cum)	24.04	5.44	30.46	10.11	11.41	18.39	14.35	37.18	6.70	21.83
sum	0.03	-0.48	0.18	-0.35	0.05	-0.04	0.01	0.26	-0.48	0.07
mean	0.00	-0.02	0.01	-0.01	0.00	0.00	0.00	0.01	-0.02	0.00
cumulative	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.01	0.01
t-statistic(ar)	-0.31	-0.51	0.60	-1.37	-0.72	-0.48	0.21	1.82	-1.37	0.72
SD	1.53	3.11	1.28	1.41	1.95	1.03	1.34	0.95	2.09	0.78
STD ERROR	0.06	0.12	0.05	0.05	0.07	0.04	0.05	0.03	0.07	0.03
T-statistic(cum)	4.51	-3.18	-3.11	-4.12	-8.73	-9.60	-0.84	11.37	-2.95	-16.42
AAR (%)	0.1	-1.7	0.6	-1.3	0.2	-0.1	0.0	0.9	-1.7	0.2
CAAR(%)	4.3	2.6	3.2	2.0	2.1	2.0	2.0	3.0	1.3	1.5

Appendix-16

AAR, CAAR, associated t-statistics and significance (Pre-2001)

DAY/COM	Day -20	Day -19	Day -18	Day -17	Day -16	Day -15	Day -14	Day -13	Day -12	Day -11	Day -10
ACEFIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HBL	0.0	0.0	0.0	0.1	-0.1	0.0	0.0	0.0	-0.1	0.1	-0.1
NABIL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NBBL	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
NFSL	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0
NHDFC1	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
NIBL1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
SBI1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SBI2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SCBL2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UICL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UICL2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sum	0.1	-0.1	0.2	0.2	-0.1	-0.1	0.0	0.1	-0.1	0.1	-0.1
Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
t-statistic(ar)	0.21	-0.19	0.11	0.14	-0.05	-0.18	0.00	0.06	-0.09	0.04	-0.13
SD	0.01	0.01	0.04	0.04	0.05	0.02	0.03	0.03	0.02	0.03	0.02
STD ERROR	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
T-statistic(cum)	2.51	-3.19	2.34	3.37	-1.38	-5.30	-0.09	2.07	-3.36	1.68	-5.00
t-stat(cum)	2.51	0.37	2.49	6.06	4.48	8.79	4.86	8.07	8.38	7.90	7.89
AAR (%)	0.9	-0.8	1.5	1.9	-0.8	-1.0	0.0	0.6	-0.6	0.4	-0.8

CAAR (%)	0.9	0.1	1.6	3.5	2.7	1.7	1.6	2.2	1.6	2.0	1.2

AAR, CAAR, associated t-statistics and significance (Pre-2001)

DAY/COM	Day -9	Day -8	Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day -0	Day +1	Day +2
ACEFIN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
HBL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-0.1	0.0
NABIL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NBBL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NFSL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
NHDFC1	0.0	0.0	0.1	-0.1	0.0	0.0	0.1	0.1	0.1	0.0	-0.1	0.0
NIBL1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SBI1	-0.1	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SBI2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SCBL2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UICL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.0	0.0
UICL2	0.0	0.1	0.0	-0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Sum	0.0	0.1	-0.1	-0.3	0.1	0.1	0.1	0.0	0.0	0.2	-0.1	0.2
Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
t-statistic(ar)	0.01	0.10	-0.03	-0.10	0.09	0.08	0.05	-0.03	0.02	0.22	-0.03	0.16
SD	0.03	0.03	0.04	0.06	0.03	0.02	0.03	0.03	0.05	0.03	0.06	0.03
STD ERROR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T-statistic(cum)	0.32	4.25	-1.57	-4.87	4.38	4.13	2.49	-1.36	1.12	12.15	-1.58	8.94
t-stat(cum)	6.03	10.34	5.04	-1.26	1.98	7.61	7.99	7.26	5.45	22.00	8.21	27.58
AAR (%)	0.1	0.9	-0.5	-2.3	1.1	0.6	0.5	-0.2	0.3	2.0	-0.6	1.5

CAAR (%)	1.3	2.2	1.7	-0.6	0.5	1.0	1.5	1.3	1.6	3.6	3.0	4.5

AAR, CAAR, associated t-statistics and significance (Pre-2001)

DAY/COM	Day+3	Day+4	Day+5	Day+6	Day+7	Day+8	Day+9	Day+10	Day+11
ACEFIN	0.1	-0.2	0.1	0.1	-0.1	0.1	0.0	0.0	0.0
HBL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NABIL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NBBL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NFSL	0.0	0.0	0.1	0.0	0.1	0.0	-0.1	0.0	-0.1
NHDFC1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1
NIBL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SBI1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
SBI2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SCBL2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UICL1	0.1	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
UICL2	0.0	0.1	-0.1	0.0	0.1	0.0	0.0	0.0	0.0
Sum	0.1	-0.2	0.1	0.0	0.0	0.2	-0.2	0.0	-0.1
Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
t-statistic(ar)	0.08	-0.06	0.02	0.03	-0.02	0.12	-0.08	0.06	-0.06
SD	0.04	0.07	0.06	0.04	0.05	0.03	0.04	0.02	0.04
STD ERROR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T-statistic(cum)	4.99	-3.79	1.30	2.07	-1.34	7.95	-5.44	3.70	-4.35
t-stat(cum)	25.30	9.86	13.26	24.47	15.70	36.16	19.28	47.20	19.33

AAR (%)	1.1	-1.5	0.4	0.4	-0.4	1.3	-1.3	0.4	-0.9
CAAR (%)	5.6	4.0	4.5	4.9	4.5	5.8	4.5	4.9	4.0

AAR, CAAR, associated t-statistics and significance (Pre-2001)

DAY/COM	Day+12	Day+13	Day+14	Day+15	Day+16	Day+17	Day+18	Day+19	Day+20
ACEFIN	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
HBL	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
NABIL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NBBL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NFSL	0.0	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0
NHDFC1	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
NIBL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SBI1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
SBI2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
SCBL2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UICL1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UICL2	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Sum	0.1	0.0	0.0	0.1	0.0	-0.2	-0.1	0.0	0.1
Mean	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
t-statistic(ar)	0.08	-0.04	-0.02	0.14	0.02	-0.12	-0.09	0.01	0.11
SD	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.03	0.03
STD ERROR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

T-statistic(cum)	5.86	-2.98	-1.23	9.73	1.14	-8.90	-7.02	0.60	8.67
t-stat(cum)	31.67	32.20	22.20	45.15	36.45	26.40	28.15	28.59	37.32
AAR (%)	0.9	-0.4	-0.2	1.2	0.2	-1.4	-0.8	0.1	1.0
CAAR (%)	4.9	4.5	4.2	5.4	5.6	4.2	3.3	3.4	4.4

Appendix-17

AAR, CAAR, associated t-statistics and significance (Post-2001)

DAY/COM	Day-20	Day-19	Day-18	Day-17	Day-16	Day-15	Day-14	Day-13	Day-12	Day-11
BOK1	0.002	0.000	-0.038	0.005	-0.031	0.041	0.027	-0.007	0.002	0.006
BOK2	-0.001	-0.001	-0.004	-0.013	-0.004	-0.007	-0.011	-0.008	-0.011	0.004
CIT	-0.038	0.053	0.001	0.001	0.000	0.000	0.011	-0.001	0.079	0.000
EBL	-0.025	-0.007	-0.009	-0.018	-0.006	-0.011	0.014	0.015	0.027	-0.016
KFL	0.002	0.009	0.004	-0.024	0.011	0.010	0.015	-0.049	0.003	0.020
NABIL2	0.000	-0.001	0.000	-0.001	0.007	-0.005	0.004	-0.007	0.001	0.009
NCML	-0.030	0.005	-0.016	0.023	0.009	0.043	0.031	0.005	-0.030	-0.020
NFCL	0.008	-0.019	0.059	0.098	0.070	-0.055	0.043	0.060	-0.040	0.007
NHDFC2	0.050	-0.032	-0.102	-0.003	0.090	-0.003	-0.003	0.003	-0.003	-0.002
NIBL2	-0.006	-0.013	0.010	-0.001	-0.007	0.001	0.003	-0.002	-0.002	0.000
NMB	0.001	0.029	-0.016	-0.004	-0.051	0.004	0.008	0.001	-0.014	-0.010
PFL	0.017	-0.007	0.037	0.042	0.064	0.016	0.037	0.024	-0.008	0.078
SCBL1	-0.001	0.005	-0.003	0.005	0.006	0.000	-0.001	-0.007	0.001	0.005
UFCML	-0.017	0.000	0.001	0.000	0.029	0.001	0.000	0.000	-0.090	-0.064
ULL	0.008	0.012	-0.004	-0.004	-0.008	0.006	-0.001	-0.001	-0.005	-0.005
UNIFIN	0.003	0.017	0.033	-0.024	-0.010	-0.003	0.003	0.069	0.141	0.092
Sum	-0.027	0.050	-0.049	0.080	0.170	0.037	0.181	0.097	0.051	0.104
Mean	-0.002	0.003	-0.003	0.005	0.011	0.002	0.011	0.006	0.003	0.006
Cumulative	-0.002	0.001	-0.002	0.003	0.014	0.016	0.028	0.034	0.037	0.043
t-statistic(ar)	-0.06	0.04	-0.05	0.00	0.01	0.02	0.17	0.03	0.04	0.03
SD	0.81	0.94	1.19	0.91	1.34	0.87	0.59	0.88	1.76	0.99
STD ERROR	0.20	0.17	0.17	0.11	0.15	0.09	0.06	0.08	0.15	0.08
T-statistic(cum)	-0.95	0.90	-1.50	-0.06	0.32	0.65	7.06	1.36	1.85	1.52
t-stat(cum)	-0.95	-0.26	-1.75	-2.70	-1.72	-2.27	3.43	3.79	3.88	8.77
AAR(%)	-0.2	0.3	-0.3	0.5	1.1	0.2	1.1	0.6	0.3	0.6

CAAR(%)	-0.2	0.1	-0.2	0.3	1.4	1.6	2.8	3.4	3.7	4.3

AAR, CAAR, associated t-statistics and significance (Post-2001)

DAY/COM	Day-10	Day-9	Day-8	Day-7	Day-6	Day-5	Day-4	Day-3	Day-2	DAY-1	DAY-0
BOK1	0.005	0.003	-0.002	-0.006	0.005	0.013	-0.011	0.007	0.019	-0.004	-0.005
BOK2	-0.002	-0.002	0.001	-0.003	0.003	-0.003	0.005	0.022	0.043	-0.007	-0.011
CIT	0.006	0.001	0.004	0.003	0.040	0.000	-0.010	0.048	0.002	0.045	0.011
EBL	-0.025	-0.012	0.000	0.037	-0.006	-0.008	-0.001	-0.023	-0.012	-0.002	-0.016
KFL	0.007	0.007	0.004	-0.030	-0.017	-0.021	0.010	0.033	0.006	-0.007	0.004
NABIL2	0.000	0.001	0.001	0.003	0.007	0.001	0.000	-0.007	0.001	-0.001	0.000
NCML	0.006	-0.030	0.020	0.009	0.007	0.006	0.051	-0.019	0.004	-0.003	0.092
NFCL	-0.006	-0.004	-0.046	-0.054	0.025	0.041	-0.027	-0.014	-0.055	0.023	0.013
NHDFC2	0.003	-0.009	-0.003	0.003	-0.009	0.026	-0.032	0.015	-0.003	0.009	-0.020
NIBL2	0.002	0.000	-0.001	0.000	-0.002	0.002	0.003	-0.002	-0.003	0.020	-0.025
NMB	-0.026	0.004	-0.001	-0.012	0.022	0.009	0.002	0.002	0.008	0.002	0.000
PFL	-0.017	-0.035	0.019	0.055	0.005	0.004	-0.050	0.015	0.000	0.003	-0.027
SCBL1	0.002	0.001	-0.006	-0.008	0.003	0.011	0.001	-0.001	0.003	0.007	0.006
UFCML	0.065	0.000	-0.064	0.001	0.013	0.051	0.000	-0.032	0.033	-0.063	0.002
ULL	-0.005	-0.005	-0.003	-0.004	-0.005	-0.008	-0.003	-0.007	0.003	0.002	0.050
UNIFIN	-0.003	-0.099	-0.049	-0.002	-0.015	0.017	-0.009	-0.003	0.014	0.016	-0.002
Sum	0.013	-0.180	-0.127	-0.007	0.077	0.140	-0.074	0.032	0.064	0.038	0.071
Mean	0.001	-0.011	-0.008	0.000	0.005	0.009	-0.005	0.002	0.004	0.002	0.004
Cumulative	0.044	0.033	0.025	0.024	0.029	0.038	0.033	0.035	0.039	0.042	0.046
t-statistic(ar)	-0.02	-0.09	-0.10	-0.01	0.09	0.12	-0.05	0.02	0.06	0.06	0.00
SD	0.78	0.80	0.65	0.90	0.67	0.59	0.52	0.95	0.97	0.92	1.12
STD ERROR	0.06	0.06	0.05	0.06	0.04	0.04	0.03	0.06	0.06	0.05	0.06
T-statistic(cum)	-1.13	-5.23	-6.06	-0.42	5.77	7.94	-3.26	1.06	4.39	4.17	0.07
t-stat(cum)	10.59	5.52	1.02	0.34	6.25	15.25	14.55	9.26	13.72	19.06	16.01
AAR(%)	0.1	-1.1	-0.8	0.0	0.5	0.9	-0.5	0.2	0.4	0.2	0.4

CAAR(%)	4.4	3.3	2.5	2.4	2.9	3.8	3.3	3.5	3.9	4.2	4.6

AAR, CAAR, associated t-statistics and significance (Post-2001)										
DAY/COM	**Day+1**	**Day+2**	**Day+3**	**Day+4**	**Day+5**	**Day+6**	**Day+7**	**Day+8**	**Day+9**	**Day+10**
BOK1	-0.030	-0.077	0.022	-0.023	0.007	0.010	0.006	0.009	0.008	-0.013
BOK2	-0.008	0.004	-0.004	-0.020	-0.002	-0.002	0.013	0.005	-0.003	0.005
CIT	0.000	-0.024	-0.024	0.001	0.000	0.004	-0.001	0.047	-0.025	-0.023
EBL	0.001	-0.014	0.027	-0.011	-0.021	0.008	-0.001	-0.013	-0.006	-0.006
KFL	0.003	0.005	0.002	-0.044	0.003	-0.059	-0.037	0.039	0.052	-0.043
NABIL2	0.015	0.038	0.001	-0.005	-0.006	-0.003	0.001	-0.004	-0.005	0.000
NCML	-0.027	-0.601	0.004	-0.115	-0.023	0.004	0.004	0.003	-0.022	0.001
NFCL	0.063	0.027	0.008	-0.010	0.124	-0.010	0.067	0.003	-0.127	0.004
NHDFC2	-0.015	-0.002	-0.003	-0.002	-0.002	-0.069	-0.061	-0.002	-0.003	-0.002
NIBL2	-0.033	-0.018	0.005	0.003	-0.016	-0.007	0.005	-0.011	-0.002	-0.002
NMB	0.003	0.008	-0.038	0.004	-0.062	0.019	0.008	0.004	0.019	0.031
PFL	0.060	-0.023	0.016	0.020	0.011	-0.006	0.047	0.023	0.014	0.033
SCBL1	0.020	-0.001	0.001	-0.003	-0.006	-0.009	-0.001	0.008	0.001	-0.002
UFCML	0.000	0.000	0.000	0.000	0.001	-0.010	0.001	0.007	0.000	0.000
ULL	0.042	0.045	-0.003	0.032	0.063	0.024	-0.003	-0.002	-0.210	0.042
UNIFIN	0.001	-0.016	0.031	0.009	-0.074	0.019	0.002	-0.004	-0.020	-0.007
Sum	0.097	-0.650	0.047	-0.165	-0.003	-0.086	0.052	0.111	-0.328	0.019
Mean	0.006	-0.041	0.003	-0.010	0.000	-0.005	0.003	0.007	-0.020	0.001
Cumulative	0.052	0.012	0.014	0.004	0.004	-0.001	0.002	0.009	-0.012	-0.010
t-statistic(ar)	0.01	-0.06	0.03	-0.10	-0.04	-0.03	0.03	0.05	-0.09	0.01
SD	1.35	3.92	0.95	0.95	1.71	0.87	0.80	0.78	2.47	0.83
STD ERROR	0.07	0.20	0.05	0.05	0.08	0.04	0.04	0.04	0.11	0.04
T-statistic(cum)	0.63	-4.88	2.32	-8.20	-3.04	-2.67	2.88	4.64	-7.48	0.45
t-stat(cum)	14.24	0.14	2.90	-5.23	-5.98	-14.67	-13.35	-9.36	-10.48	-31.26
AAR(%)	0.6	-4.1	0.3	-1.0	0.0	-0.5	0.3	0.7	-2.0	0.1

CAAR(%)	5.2	1.2	1.4	0.4	0.4	-0.1	0.2	0.9	-1.2	-1.0

AAR, CAAR, associated t-statistics and significance (Post-2001)

DAY/COM	Day+11	Day+12	Day+13	Day+14	Day+15	Day+16	Day+17	Day+18	Day+19	Day+20
BOK1	-0.021	-0.007	0.004	0.005	-0.007	0.057	0.012	0.041	0.005	-0.032
BOK2	0.000	-0.005	0.011	0.001	-0.009	0.006	0.004	0.038	0.024	-0.021
CIT	0.004	-0.002	0.003	0.000	0.024	0.000	0.049	0.002	0.025	-0.022
EBL	-0.005	0.005	-0.002	0.011	-0.004	0.012	-0.020	0.007	0.000	-0.006
KFL	-0.054	-0.045	0.012	0.005	-0.029	0.000	-0.024	0.020	-0.006	-0.004
NABIL2	-0.001	0.000	-0.004	0.000	-0.006	0.000	0.012	0.000	0.007	0.000
NCML	-0.030	-0.010	0.015	0.047	0.012	0.030	0.026	0.004	0.020	0.004
NFCL	-0.040	-0.001	0.001	0.023	0.064	-0.007	-0.104	-0.008	-0.007	-0.010
NHDFC2	-0.030	-0.045	-0.002	-0.002	-0.040	0.034	-0.108	-0.051	-0.003	-0.003
NIBL2	-0.003	0.022	0.002	-0.001	0.004	-0.004	-0.001	-0.001	0.001	-0.001
NMB	-0.003	0.080	0.008	0.004	-0.022	-0.014	-0.035	-0.005	0.006	-0.012
PFL	0.034	-0.043	0.034	0.052	-0.025	-0.002	0.010	0.039	0.037	-0.030
SCBL1	-0.049	-0.003	0.000	0.001	0.003	-0.002	-0.001	-0.001	0.001	0.001
UFCML	-0.034	0.001	-0.001	0.034	0.000	0.000	0.000	0.000	0.000	0.000
ULL	-0.023	0.012	0.007	-0.005	-0.006	-0.005	-0.004	-0.004	-0.004	0.029
UNIFIN	0.006	0.051	0.015	0.001	-0.025	-0.014	-0.011	-0.006	0.002	-0.002
Sum	-0.249	0.011	0.103	0.178	-0.066	0.092	-0.195	0.074	0.106	-0.109
Mean	-0.016	0.001	0.006	0.011	-0.004	0.006	-0.012	0.005	0.007	-0.007
Cumulative	-0.026	-0.025	-0.019	-0.008	-0.012	-0.006	-0.018	-0.014	-0.007	-0.014
t-statistic(ar)	-0.19	0.06	0.16	0.18	-0.05	0.07	-0.06	0.06	0.14	-0.11
SD	0.94	1.45	0.28	0.39	0.82	1.01	1.49	1.03	0.52	0.74
STD ERROR	0.04	0.06	0.01	0.02	0.03	0.04	0.06	0.04	0.02	0.03
T-statistic(cum)	-16.97	5.22	15.05	16.73	-4.71	6.72	-5.99	6.12	13.81	-11.12
t-stat(cum)	-44.82	-24.48	-113.97	-66.34	-36.50	-23.47	-22.05	-26.25	-38.35	-38.73
AAR(%)	-1.6	0.1	0.6	1.1	-0.4	0.6	-1.2	0.5	0.7	-0.7

CAAR(%)	-2.6	-2.5	-1.9	-0.8	-1.2	-0.6	-1.8	-1.4	-0.7	-1.4

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AAR, CAAR, associated t-statistics and significance (Large dividends)

Company	Day-20	Day-19	Day-18	Day-17	Day-16	Day-15	Day-14	Day-13	Day-12	Day-11
ACEFIN	-0.01	-0.01	0.00	0.04	0.01	-0.02	-0.01	0.01	-0.01	-0.03
EBL	-0.02	-0.01	-0.01	-0.02	-0.01	-0.01	0.01	0.02	0.03	-0.02
HBL	0.03	-0.03	0.00	0.05	-0.05	-0.01	-0.01	0.03	-0.06	0.08
NABIL1	0.01	0.00	0.01	0.00	0.04	0.00	0.01	0.01	0.00	0.01
NABIL2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	-0.01	0.00	0.01
NIBL1	0.01	0.01	0.00	-0.02	-0.05	0.00	0.00	0.00	-0.01	0.00
NIBL2	-0.01	-0.01	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
NFCL	0.01	-0.02	0.06	0.10	0.07	-0.06	0.04	0.06	-0.04	0.01
NMB	0.00	0.03	-0.02	0.00	-0.05	0.00	0.01	0.00	-0.01	-0.01
SBI1	0.01	0.00	0.00	0.03	0.02	0.00	0.00	0.02	0.00	0.00
SBI2	0.00	-0.01	0.01	0.00	-0.01	-0.01	0.03	-0.02	0.01	-0.01
SCBL1	0.00	0.01	0.00	0.01	0.01	0.00	0.00	-0.01	0.00	0.00
SCBL2	-0.01	0.00	0.00	0.02	0.00	0.00	0.00	-0.03	-0.01	-0.01
ULL	0.01	0.01	0.00	0.00	-0.01	0.01	0.00	0.00	-0.01	0.00
Sum	0.03	-0.02	0.06	0.20	-0.02	-0.10	0.10	0.08	-0.10	0.02
Mean	0.00	0.00	0.00	0.01	0.00	-0.01	0.01	0.01	-0.01	0.00
Cumulative	0.00	0.00	0.00	0.02	0.02	0.01	0.02	0.02	0.02	0.02
t-statistic(ar)	0.20	-0.40	0.91	1.49	-0.27	-1.86	2.09	-0.11	-0.67	-0.12
SD	0.72	0.79	0.70	1.22	1.85	0.54	0.96	1.37	0.95	1.07
STD ERROR	0.19	0.15	0.11	0.16	0.22	0.06	0.10	0.13	0.08	0.09
T-statistic(cum)	0.20	-0.57	1.57	2.97	-0.59	-4.55	5.54	-0.31	-2.01	-0.36
t-stat(cum)	0.20	-0.30	1.15	3.73	2.15	3.57	7.69	5.45	6.32	5.55
AAR (%)	0.2	-0.2	0.4	1.4	-0.2	-0.7	0.7	0.6	-0.7	0.2

CAAR (%)	0.2	0.0	0.4	1.9	1.7	1.0	1.7	2.3	1.6	1.7

AAR, CAAR, associated t-statistics and significance (Large dividends)

Company	Day-10	Day-9	Day-8	Day-7	Day-6	Day-5	Day-4	Day-3	Day-2	Day-1	Day-0
ACEFIN	-0.03	-0.01	-0.02	0.00	0.01	0.02	0.00	-0.01	-0.01	0.02	0.01
EBL	-0.02	-0.01	0.00	0.04	-0.01	-0.01	0.00	-0.02	-0.01	0.00	-0.02
HBL	-0.05	-0.01	0.03	0.02	-0.03	-0.02	0.00	0.02	-0.01	0.01	0.08
NABIL1	0.00	0.01	0.01	0.00	-0.01	-0.01	0.00	-0.02	-0.01	-0.01	0.01
NABIL2	0.00	0.00	0.00	0.00	0.01	0.00	0.00	-0.01	0.00	0.00	0.00
NIBL1	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.01	-0.01	-0.01	-0.01
NIBL2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	-0.03
NFCL	-0.01	0.00	-0.05	-0.05	0.03	0.04	-0.03	-0.01	-0.05	0.02	0.01
NMB	-0.03	0.00	0.00	-0.01	0.02	0.01	0.00	0.00	0.01	0.00	0.00
SBI1	0.00	-0.07	0.03	-0.10	-0.03	-0.06	0.01	0.01	-0.02	0.00	0.01
SBI2	-0.01	0.01	-0.01	0.01	0.01	0.00	0.00	0.01	0.00	-0.01	0.00
SCBL1	0.00	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00	0.00	0.01	0.01
SCBL2	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01	0.02
ULL	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	0.05
Sum	-0.15	-0.08	-0.01	-0.11	-0.02	0.04	-0.02	-0.03	-0.11	0.03	0.14
Mean	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	-0.01	0.00	0.01
Cumulative	0.01	0.00	0.00	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01
t-statistic(ar)	-2.29	-0.87	0.15	-0.62	-0.55	0.10	-0.39	-0.75	-2.01	-0.07	0.93
SD	0.77	1.19	0.87	1.92	0.85	1.50	0.33	0.87	0.64	0.86	1.35
STD ERROR	0.06	0.09	0.06	0.14	0.06	0.10	0.02	0.05	0.04	0.05	0.08
T-statistic(cum)	-7.59	-3.01	0.54	-2.31	-2.11	0.40	-1.59	-3.19	-8.75	-0.32	4.27
t-stat(cum)	0.49	-2.68	-3.25	-3.84	-11.06	-6.11	-30.27	-14.93	-29.57	-23.06	-10.69
AAR (%)	-1.1	-0.6	-0.1	-0.8	-0.2	0.3	-0.2	-0.2	-0.8	0.2	1.0

CAAR (%)	0.7	0.1	0.0	-0.8	-0.9	-0.7	-0.8	-1.0	-1.8	-1.6	-0.6

AAR, CAAR, associated t-statistics and significance (Large dividends)

Company	Day+1	Day+2	Day+3	Day+4	Day+5	Day+6	Day+7	Day+8	Day+9	Dya+10
ACEFIN	0.08	0.08	0.08	-0.23	0.08	0.09	-0.10	0.09	-0.01	-0.04
EBL	0.00	-0.01	0.03	-0.01	-0.02	0.01	0.00	-0.01	-0.01	-0.01
HBL	-0.09	-0.01	0.00	0.00	-0.01	-0.03	0.01	0.04	-0.05	0.00
NABIL1	0.00	0.03	-0.02	0.00	0.01	0.01	0.03	0.01	0.02	0.00
NABIL2	0.02	0.04	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00
NIBL1	0.01	0.00	-0.02	0.00	-0.01	-0.01	-0.04	-0.02	0.03	0.00
NIBL2	-0.03	-0.02	0.01	0.00	-0.02	-0.01	0.01	-0.01	0.00	0.00
NFCL	0.06	0.03	0.01	-0.01	0.12	-0.01	0.07	0.00	-0.13	0.00
NMB	0.00	0.01	-0.04	0.00	-0.06	0.02	0.01	0.00	0.02	0.03
SBI1	0.01	0.05	-0.04	-0.03	-0.09	-0.02	-0.01	0.00	0.03	0.00
SBI2	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00
SCBL1	0.02	0.00	0.00	0.00	-0.01	-0.01	0.00	0.01	0.00	0.00
SCBL2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00
ULL	0.04	0.05	0.00	0.03	0.06	0.02	0.00	0.00	-0.21	0.04
Sum	0.12	0.23	0.00	-0.27	0.07	0.04	-0.04	0.13	-0.31	0.03
Mean	0.01	0.02	0.00	-0.02	0.00	0.00	0.00	0.01	-0.02	0.00
Cumulative	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.01	-0.01	-0.01
t-statistic(ar)	0.52	1.80	-0.62	-1.46	-0.53	-0.21	-0.11	0.94	-0.94	0.69
SD	1.70	1.64	1.27	1.51	2.34	0.97	1.29	1.18	2.80	0.77
STD ERROR	0.10	0.09	0.07	0.08	0.12	0.05	0.07	0.06	0.14	0.04
T-statistic(cum)	2.43	8.65	-3.03	-7.28	-2.70	-1.07	-0.56	5.06	-5.13	3.84
t-stat(cum)	-6.30	1.97	-0.44	-7.66	-7.72	-20.17	-15.89	-12.61	-10.55	-35.29
AAR (%)	0.9	1.6	0.0	-1.9	0.5	0.3	-0.3	0.9	-2.2	0.2
CAAR (%)	0.3	1.9	1.9	0.0	0.5	0.8	0.5	1.4	-0.8	-0.7

AAR, CAAR, associated t-statistics and significance (Large dividends)

Company	Day+11	Day+12	Day+13	Day+14	Day+15	Day+16	Day+17	Day+18	Day+19	Day+20
ACEFIN	0.02	-0.01	0.00	-0.10	-0.01	-0.03	-0.01	-0.01	-0.01	-0.01
EBL	-0.01	0.00	0.00	0.01	0.00	0.01	-0.02	0.01	0.00	-0.01
HBL	0.02	0.04	-0.09	0.02	0.01	-0.03	-0.01	0.03	0.02	0.08
NABIL1	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	-0.01	-0.01
NABIL2	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.00	0.01	0.00
NIBL1	-0.01	0.00	0.00	-0.04	0.03	-0.01	0.00	-0.01	0.00	0.00
NIBL2	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NFCL	-0.04	0.00	0.00	0.02	0.06	-0.01	-0.10	-0.01	-0.01	-0.01
NMB	0.00	0.08	0.01	0.00	-0.02	-0.01	-0.03	-0.01	0.01	-0.01
SBI1	0.00	0.00	0.02	0.03	0.05	0.04	0.00	0.00	0.00	0.00
SBI2	0.00	0.00	0.01	0.00	-0.01	0.00	0.00	0.00	-0.06	-0.01
SCBL1	-0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCBL2	0.02	0.00	0.00	0.00	0.00	0.00	-0.01	-0.05	0.05	0.01
ULL	-0.02	0.01	0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.03
Sum	-0.05	0.13	-0.06	-0.05	0.11	-0.04	-0.18	-0.04	-0.02	0.09
Mean	0.00	0.01	0.00	0.00	0.01	0.00	-0.01	0.00	0.00	0.01
Cumulative	-0.01	0.00	-0.01	-0.01	0.00	0.00	-0.02	-0.02	-0.02	-0.02
t-statistic(ar)	-0.38	1.45	-0.38	-0.04	1.08	-0.21	-1.88	-0.80	-0.24	0.83
SD	1.35	1.39	0.97	1.05	1.19	0.82	1.04	1.40	2.17	1.02
STD ERROR	0.06	0.06	0.04	0.05	0.05	0.04	0.04	0.06	0.09	0.04
T-statistic(cum)	-2.17	8.32	-2.22	-0.24	6.50	-1.29	-11.62	-5.02	-1.50	5.31
t-stat(cum)	-22.60	-14.01	-22.59	-21.40	-12.62	-19.91	-27.51	-25.64	-18.29	-34.04
AAR (%)	-0.3	0.9	-0.5	-0.3	0.8	-0.3	-1.3	-0.3	-0.1	0.6

CAAR (%)	-1.0	-0.1	-0.5	-0.9	-0.1	-0.4	-1.7	-2.0	-2.1	-1.5

Appendix-19

AAR, CAAR, associated t-statistics and significance (Small dividends)

Company	Day-20	Day-19	Day-18	Day-17	Day-16	Day-15	Day-14	Day-13	Day-12	Day-11
BOK1	0.00	0.00	-0.04	0.00	-0.03	0.04	0.03	-0.01	0.00	0.01
BOK2	0.00	0.00	0.00	-0.01	0.00	-0.01	-0.01	-0.01	-0.01	0.00
CIT	-0.04	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.08	0.00
KFL	0.00	0.01	0.00	-0.02	0.01	0.01	0.01	-0.05	0.00	0.02
NBBL	0.01	-0.01	0.00	-0.02	-0.05	-0.03	-0.08	0.02	0.00	0.00
NCML	-0.03	0.01	-0.02	0.02	0.01	0.04	0.03	0.01	-0.03	-0.02
NFSL	0.02	-0.01	0.07	0.11	0.08	-0.05	0.05	0.06	-0.03	0.01
NHDFC1	0.03	-0.03	0.11	-0.03	-0.09	-0.01	0.00	-0.02	0.00	0.00
NHDFC2	0.05	-0.03	-0.10	0.00	0.09	0.00	0.00	0.00	0.00	0.00
PFL	0.02	-0.01	0.04	0.04	0.06	0.02	0.04	0.02	-0.01	0.08
UICL1	0.00	0.00	0.01	-0.01	0.00	0.01	0.01	0.00	0.01	0.03
UICL2	0.01	-0.01	-0.03	0.06	-0.01	-0.01	-0.01	-0.01	0.01	-0.02
UFCML	-0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	-0.09	-0.06
UNIFIN	0.00	0.02	0.03	-0.02	-0.01	0.00	0.00	0.07	0.14	0.09
Sum	0.05	-0.02	0.07	0.11	0.09	0.01	0.08	0.08	0.08	0.13
Mean	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01
Cumulative	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.03	0.04	0.05
t-statistic(ar)	0.34	0.06	-0.13	0.43	-0.24	0.14	0.10	0.41	0.73	0.79
SD	0.78	0.86	1.59	1.18	1.48	0.94	1.25	0.89	1.77	1.04
STD ERROR	0.21	0.16	0.25	0.16	0.18	0.10	0.13	0.08	0.16	0.09
T-statistic(cum)	0.34	0.08	-0.23	0.86	-0.53	0.33	0.27	1.16	2.20	2.50
t-stat(cum)	0.34	0.52	0.12	1.04	0.39	1.00	1.09	2.79	3.69	9.13
AAR (%)	0.4	-0.1	0.5	0.8	0.7	0.1	0.6	0.6	0.5	0.9

CAAR (%)	0.4	0.2	0.7	1.5	2.2	2.3	2.9	3.4	4.0	4.9

AAR, CAAR, associated t-statistics and significance (small dividends)

Company	Day-10	Day-9	Day-8	Day-7	Day-6	Day-5	Day-4	Day-3	Day-2	Day-1	Day-0
BOK1	0.00	0.00	0.00	-0.01	0.00	0.01	-0.01	0.01	0.02	0.00	0.00
BOK2	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	-0.01	-0.01
CIT	0.01	0.00	0.00	0.00	0.04	0.00	-0.01	0.05	0.00	0.05	0.01
KFL	0.01	0.01	0.00	-0.03	-0.02	-0.02	0.01	0.03	0.01	-0.01	0.00
NBBL	0.00	0.00	0.04	0.02	0.03	0.01	0.04	0.02	0.01	0.01	-0.01
NCML	0.01	-0.03	0.02	0.01	0.01	0.01	0.05	-0.02	0.00	0.00	0.09
NFSL	0.00	0.00	-0.03	-0.05	0.04	0.05	-0.02	-0.01	-0.05	0.03	0.02
NHDFC1	0.00	0.00	0.00	0.08	-0.09	0.02	0.00	0.07	0.07	0.10	0.04
NHDFC2	0.00	-0.01	0.00	0.00	-0.01	0.03	-0.03	0.01	0.00	0.01	-0.02
PFL	-0.02	-0.04	0.02	0.06	0.00	0.00	-0.05	0.01	0.00	0.00	-0.03
UICL1	0.01	0.03	0.00	-0.04	0.00	0.00	0.00	-0.01	0.00	-0.11	0.05
UICL2	-0.01	0.04	0.05	0.00	-0.19	0.06	0.05	-0.04	0.00	0.03	0.03
UFCML	0.06	0.00	-0.06	0.00	0.01	0.05	0.00	-0.03	0.03	-0.06	0.00
UNIFIN	0.00	-0.10	-0.05	0.00	-0.01	0.02	-0.01	0.00	0.01	0.02	0.00
Sum	0.07	-0.09	-0.01	0.04	-0.17	0.23	0.02	0.12	0.15	0.05	0.17
Mean	0.01	-0.01	0.00	0.00	-0.01	0.02	0.00	0.01	0.01	0.00	0.01
Cumulative	0.05	0.05	0.05	0.05	0.04	0.05	0.06	0.06	0.07	0.08	0.09
t-statistic(ar)	1.27	-0.17	0.28	-0.16	-0.72	2.62	0.69	1.12	1.80	0.10	1.49
SD	0.49	1.09	1.13	0.96	2.59	0.80	0.95	1.16	1.03	1.85	1.01
STD ERROR	0.04	0.08	0.08	0.07	0.18	0.05	0.06	0.07	0.06	0.11	0.06
T-statistic(cum)	4.20	-0.58	1.03	-0.60	-2.78	10.48	2.83	4.75	7.85	0.47	6.81
t-stat(cum)	24.41	10.94	12.01	14.00	2.62	19.22	19.44	21.22	32.38	18.93	42.53
AAR (%)	0.5	-0.7	0.0	0.3	-1.2	1.6	0.1	0.8	1.0	0.3	1.2

CAAR (%)	5.4	4.8	4.7	5.0	3.8	5.4	5.6	6.4	7.4	7.7	8.9

AAR, CAAR, associated t-statistics and significance (Small dividends)

Company	Day+1	Day+2	Day+3	Day+4	Day+5	Day+6	Day+7	Day+8	Day+9	Day+10
BOK1	-0.03	-0.08	0.02	-0.02	0.01	0.01	0.01	0.01	0.01	-0.01
BOK2	-0.01	0.00	0.00	-0.02	0.00	0.00	0.01	0.00	0.00	0.00
CIT	0.00	-0.02	-0.02	0.00	0.00	0.00	0.00	0.05	-0.03	-0.02
KFL	0.00	0.01	0.00	-0.04	0.00	-0.06	-0.04	0.04	0.05	-0.04
NBBL	0.00	0.01	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.04
NCML	-0.03	-0.60	0.00	-0.12	-0.02	0.00	0.00	0.00	-0.02	0.00
NFSL	0.07	0.03	0.01	0.00	0.13	-0.01	0.07	-0.02	-0.14	0.02
NHDFC1	-0.14	0.00	0.00	0.00	0.03	0.04	-0.08	0.01	-0.02	-0.01
NHDFC2	-0.01	0.00	0.00	0.00	0.00	-0.07	-0.06	0.00	0.00	0.00
PFL	0.06	-0.02	0.02	0.02	0.01	-0.01	0.05	0.02	0.01	0.03
UICL1	0.00	0.00	0.09	0.02	-0.06	-0.04	0.00	0.02	0.00	0.01
UICL2	-0.01	0.00	0.01	0.07	-0.06	0.04	0.08	0.00	-0.01	0.03
UFCML	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.01	0.00	0.00
UNIFIN	0.00	-0.02	0.03	0.01	-0.07	0.02	0.00	0.00	-0.02	-0.01
Sum	-0.09	-0.70	0.18	-0.09	-0.02	-0.08	0.05	0.13	-0.17	0.04
Mean	-0.01	-0.05	0.01	-0.01	0.00	-0.01	0.00	0.01	-0.01	0.00
Cumulative	0.08	0.03	0.05	0.04	0.04	0.03	0.04	0.05	0.03	0.04
t-statistic(ar)	-1.18	-1.34	1.52	-0.41	-0.48	-0.44	0.37	1.93	-1.32	0.33
SD	1.32	3.86	1.24	1.33	1.55	1.12	1.42	0.69	1.07	0.81
STD ERROR	0.08	0.22	0.07	0.07	0.08	0.06	0.07	0.03	0.05	0.04
T-statistic(cum)	-5.52	-6.45	7.45	-2.04	-2.46	-2.30	1.97	10.42	-7.23	1.82
t-stat(cum)	27.58	3.22	17.73	14.83	10.46	12.49	11.96	35.54	16.09	23.30
AAR (%)	-0.7	-5.0	1.3	-0.6	-0.1	-0.6	0.4	1.0	-1.2	0.3

CAAR (%)	8.3	3.3	4.5	3.9	3.8	3.2	3.6	4.6	3.4	3.6

AAR, CAAR, associated t-statistics and significance (Small dividends)

Company	Day+11	Day+12	Day+13	Day+14	Day+15	Day+16	Day+17	Day+18	Day+19	Day+20
BOK1	-0.02	-0.01	0.00	0.01	-0.01	0.06	0.01	0.04	0.01	-0.03
BOK2	0.00	-0.01	0.01	0.00	-0.01	0.01	0.00	0.04	0.02	-0.02
CIT	0.00	0.00	0.00	0.00	0.02	0.00	0.05	0.00	0.02	-0.02
KFL	-0.05	-0.04	0.01	0.00	-0.03	0.00	-0.02	0.02	-0.01	0.00
NBBL	0.00	0.00	0.00	0.00	0.00	-0.01	-0.02	0.00	-0.01	0.00
NCML	-0.03	-0.01	0.02	0.05	0.01	0.03	0.03	0.00	0.02	0.00
NFSL	-0.07	0.01	0.02	0.06	0.04	0.00	-0.10	0.00	0.00	-0.01
NHDFC1	-0.11	0.10	0.00	0.03	-0.01	0.08	0.04	0.00	0.02	0.04
NHDFC2	-0.03	-0.05	0.00	0.00	-0.04	0.03	-0.11	-0.05	0.00	0.00
PFL	0.03	-0.04	0.03	0.05	-0.03	0.00	0.01	0.04	0.04	-0.03
UICL1	-0.01	0.00	0.01	0.00	0.05	-0.04	-0.01	0.00	0.00	0.01
UICL2	0.01	-0.01	0.00	-0.03	-0.02	0.02	-0.04	-0.06	0.03	0.00
UFCML	-0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
UNIFIN	0.01	0.05	0.01	0.00	-0.02	-0.01	-0.01	-0.01	0.00	0.00
Sum	-0.31	-0.01	0.12	0.20	-0.04	0.16	-0.18	0.01	0.13	-0.07
Mean	-0.02	0.00	0.01	0.01	0.00	0.01	-0.01	0.00	0.01	-0.01
Cumulative	0.01	0.01	0.02	0.04	0.03	0.04	0.03	0.03	0.04	0.04
t-statistic(ar)	-2.68	0.09	3.60	1.36	-0.16	1.26	-0.89	0.22	1.92	-1.21
SD	1.00	1.08	0.24	0.71	0.96	1.31	1.52	1.39	0.68	0.78
STD ERROR	0.05	0.05	0.01	0.03	0.04	0.06	0.07	0.06	0.03	0.03
T-statistic(cum)	-15.17	0.54	21.01	8.02	-0.96	7.63	-5.49	1.37	12.15	-7.74
t-stat(cum)	4.14	4.41	40.90	22.37	15.69	19.31	11.33	13.92	41.07	28.35
AAR (%)	-2.2	0.0	0.8	1.4	-0.3	1.1	-1.3	0.1	1.0	-0.5

CAAR (%)	1.4	1.4	2.2	3.6	3.3	4.5	3.2	3.3	4.2	3.7

Appendix-20

Autocorrelation Coefficients (Daily returns)

Lag	1	2	3	4	5	6	7	8	9	10
NEPSE	0.04	0.06*	0.04*	0.01*	0.01*	-0.01*	-0.01*	-0.07*	0.03*	0.00*
ACEFIN	-0.11*	0.13*	0.02*	0.09*	-0.03*	0.01*	0.08	0.00*	-0.01*	0.02*
ANPF	-0.06	-0.09	0.08	-0.03	-0.08	-0.04	-0.09	0.01	0.04	0.02
BOK	0.14*	0.02*	-0.06*	-0.04*	-0.06*	-0.04*	-0.04*	-0.03*	0.03*	-0.02*
BBC	-0.27*	0.06*	0.00*	0.05*	0.03*	-0.06*	0.05*	-0.05*	0.07*	0.00*
CIT	-0.12*	0.00*	0.00*	-0.04*	0.05*	0.04*	0.03	-0.02	0.05	-0.03
EBL	0.09*	-0.01*	-0.08*	-0.04*	-0.06*	-0.04*	-0.02*	-0.03*	0.01*	-0.02*
EICL	-0.09*	0.06*	0.08*	0.07*	0.04*	0.03*	0.00*	0.05*	-0.01*	-0.02*
GRUL	-0.03	0.14*	0.04*	-0.01*	0.07*	0.06*	0.01*	0.06*	0.02*	0.04*
HBTF	0.04	0.00	0.03	0.00	-0.02	-0.11	-0.05	-0.05	-0.02	0.01
HBL	-0.03	0.02	0.02	0.00	-0.06	-0.03	0.02	-0.02	-0.02	-0.01
HGIC	0.04	0.13*	0.03	0.06	0.09*	0.08*	-0.03*	0.07*	0.02*	0.01*
KFL	-0.09*	0.02*	-0.03	0.04	-0.02	-0.04	-0.03	-0.03	0.02	-0.05
NABIL	0.10*	0.00*	-0.06*	0.00*	-0.04*	-0.02*	0.01*	0.03*	-0.02*	0.02*
NFCL	-0.14*	0.03*	-0.02*	0.10*	0.07*	0.00*	-0.05*	0.11*	-0.02*	-0.09*
NEIL	-0.04	0.05	0.01	0.03	0.09	-0.04	0.06	-0.04	0.07	0.02
NBBL	0.08*	0.01*	-0.03*	-0.03*	-0.03*	-0.05*	-0.01*	-0.02*	0.01*	0.02*
NFSC	0.00	0.02	0.05	0.01	-0.05	0.01	0.01	0.00	0.03	0.04
NHDFC	-0.14*	-0.02*	-0.02*	-0.02*	-0.05*	0.06*	0.08*	0.00*	-0.02*	-0.02*
NICL	-0.15*	-0.07*	-0.01*	0.02*	-0.03*	-0.01*	0.04*	-0.01	0.02	0.02
NIBL	0.02	0.03	-0.04	-0.06	0.01	0.02	0.00	-0.03	-0.05	-0.02
SBI	0.03	0.02	-0.02	-0.04	-0.02	-0.04	-0.02	-0.05*	0.05*	0.01*
NCML	-0.01	0.02	0.05	0.03	0.00	0.04	0.05	0.03	0.07	0.01
PFL	-0.31*	0.02*	-0.01*	-0.03*	0.01*	0.03*	-0.04*	0.03*	-0.02*	0.04*
PICL	-0.14*	0.02*	-0.05*	-0.05*	0.05*	-0.10*	0.06*	-0.08*	0.04*	-0.03*
SHL	-0.17*	-0.02*	-0.06*	0.04*	-0.01*	-0.02*	0.00*	0.00*	0.01*	0.07*
SCBL	-0.44*	0.01*	0.00*	0.00*	0.01*	0.00*	-0.01*	0.00*	-0.01*	0.01*
TRHL	0.00	-0.06	0.04	-0.06	-0.03	0.04	-0.01	-0.06	0.04	-0.03
ULL	-0.03	0.10*	0.16*	0.01*	0.01*	0.06*	-0.04*	-0.01*	-0.02*	-0.05*

UICL	-0.13*	0.01*	0.03*	-0.01*	0.00*	-0.05*	-0.04*	0.05*	-0.01*	-0.02*
UFCML	0.06	-0.01	0.05	-0.09	-0.05	0.03	-0.03	0.06	0.05	-0.02

Autocorrelation coefficients (Daily returns)

Lag	11	12	13	14	15	16	17	18	19	20
NEPSE	0.06*	0.02*	0.03*	0.01*	0.00*	0.03*	0.03*	0.02*	0.01*	-0.02*
ACEFIN	-0.02*	0.01*	-0.04*	0.03*	0.03	0.02	0.00	0.04	0.06	0.01
ANPF	-0.05	0.00	-0.02	0.04	0.03	0.05	-0.02	0.06	0.00	-0.01
BOK	0.03*	0.02*	0.08*	0.01*	0.06*	0.00*	0.03*	0.00*	0.00*	0.03*
BBC	-0.02*	0.06*	-0.10*	0.13*	0.00*	-0.04*	0.05*	-0.02*	0.07*	-0.07*
CIT	0.00	0.01	0.04	-0.10	0.12*	-0.05*	0.04*	0.06*	-0.06*	0.06*
EBL	0.01*	0.01*	-0.02*	0.00*	0.01*	0.04*	0.02*	-0.02*	0.00*	0.01*
EICL	0.00*	0.00*	0.02*	-0.01*	0.01*	0.01*	-0.02*	0.04*	0.00*	-0.03*
GRUL	0.00	0.09*	-0.01*	0.07*	0.00*	-0.01	0.01	-0.03	-0.03	0.01
HBTF	-0.01	0.05	0.04	0.04	-0.09	0.01	-0.11	-0.08	0.01	-0.07
HBL	0.00	-0.05	0.01	-0.05	0.02	-0.01	0.04	0.01	0.01	0.01
HGIC	0.04	0.01	0.07	0.04	-0.02	-0.06	0.02	-0.07	0.14*	0.10*
KFL	-0.08	-0.01	0.06	-0.05	0.02	-0.04	0.06*	0.02*	-0.02*	0.08*
NABIL	-0.03*	-0.01*	0.02*	0.02*	-0.01*	0.02*	-0.01*	0.01*	0.00*	0.01*
NFCL	0.07*	-0.05*	0.08*	-0.11*	0.11*	0.04*	-0.02*	-0.05*	0.10*	0.06*
NEIL	0.04	0.02	0.02	0.02	0.09	-0.02	0.05	0.03	0.04	0.00
NBBL	0.04*	0.05*	0.02*	-0.01*	-0.02*	0.00*	-0.01*	0.01*	0.03*	0.00*
NFSC	-0.04	0.01	-0.01	0.00	0.07	-0.01	-0.04	0.09	0.01	0.04
NHDFC	0.01*	0.01*	0.00*	-0.05*	0.04*	-0.05*	-0.03*	0.10*	0.06*	-0.02*
NICL	-0.10	0.04	0.01	-0.04	-0.01	0.04	-0.02	0.08	0.00	-0.03
NIBL	0.02	0.02	0.02	-0.01	-0.02	0.00	0.05	0.02	0.01	-0.01
SBI	0.03*	-0.02*	0.02*	0.00*	-0.04*	0.01*	0.02*	0.00	-0.02	0.01
NCML	0.02	0.00	0.02	0.06	0.02	0.02	0.03	0.04	-0.03	0.07
PFL	0.01*	0.03*	-0.01*	-0.03*	-0.05*	0.06*	0.00*	-0.01*	-0.01*	-0.03*
PICL	0.04*	0.06*	-0.06*	0.04*	0.05*	-0.06*	-0.01*	0.00*	-0.03*	0.04*
SHL	0.00*	0.00	-0.11*	0.02*	0.09*	-0.03*	0.03*	0.08*	-0.02*	0.05*
SCBL	0.00*	0.00*	-0.01*	0.00*	-0.01*	0.00*	0.00*	0.00*	0.00*	0.01*
TRHL	-0.01	0.02	-0.04	-0.07	0.03	0.00	0.00	0.03	0.01	-0.01

ULL	0.04*	-0.05*	-0.03*	0.03*	0.02*	0.03*	0.08*	0.01*	0.11*	0.01*
UICL	0.02*	0.01*	0.02	0.01	0.01	0.02	-0.01	0.01	0.04	-0.02
UFCML	0.04	0.08	-0.05	0.02	-0.04	-0.02	0.01	-0.07	0.04	0.05

Autocorrelation coefficients (Daily returns)

Lag	21	22	23	24	25	26	27	28	29	30
NEPSE	0.01*	0.00*	0.08*	-0.04*	0.05*	-0.03*	0.00*	0.06*	-0.01*	0.03*
ACEFIN	-0.03	0.06	0.00	0.01	-0.02	0.11	0.00	0.01	0.01	0.04
ANPF	0.03	0.02	-0.05	0.01	0.00	-0.01	-0.01	0.00	-0.03	0.08
BOK	-0.04*	0.02*	0.01*	0.04*	0.02*	0.05*	0.04*	0.03*	0.06*	0.04*
BBC	0.02*	0.00*	0.02*	0.00*	-0.09*	0.11*	-0.09*	0.08*	0.02*	0.01*
CIT	-0.03*	0.00*	-0.01*	-0.05*	0.00*	0.07*	-0.04*	0.05*	0.04*	0.03*
EBL	0.01*	0.00*	-0.02*	-0.02*	0.05*	0.04*	-0.01*	0.01*	0.03*	-0.01*
EICL	0.02*	0.00	-0.04	0.01	0.00	-0.03	0.02	-0.03	-0.05	-0.01
GRUL	-0.02	0.04	-0.03	0.08	-0.02	0.04	-0.01	-0.02	-0.02	0.01
HBTF	0.01*	-0.07*	0.08*	0.04*	0.04*	0.07*	-0.02*	-0.02*	0.01*	-0.04*
HBL	-0.01	0.03	0.00	0.01	0.03	0.02	0.00	-0.02	0.01	-0.03
HGIC	0.07*	-0.02*	0.06*	0.11*	0.05*	-0.01*	0.03*	-0.02*	0.05*	0.04*
KFL	-0.05*	0.08*	-0.02*	0.05*	-0.03*	0.07*	-0.04*	-0.01*	0.00*	0.03*
NABIL	0.01*	-0.01*	-0.02*	-0.03*	0.01*	0.03*	0.02*	0.01*	0.02*	0.00*
NFCL	0.02*	0.04*	0.03*	0.07*	-0.04*	-0.04*	0.06*	0.04*	-0.07*	0.01*
NEIL	-0.02	0.11	-0.11	-0.08	0.04	0.12	0.02	-0.03	0.05	0.04
NBBL	0.03*	0.02*	0.03*	0.00*	0.01*	0.01*	-0.01*	0.02*	0.04*	0.04*
NFSC	0.09	0.07	0.00	0.01	0.07	-0.01	0.04	-0.02	0.08	0.01
NHDFC	-0.01*	0.01*	-0.06*	0.07*	-0.02*	0.03*	-0.04*	0.01*	-0.06*	0.10*
NICL	-0.03	0.03	-0.06	0.02	-0.02	0.00	0.05	0.02	-0.02	0.05
NIBL	0.02	0.02	0.05	0.02	-0.01	-0.02	-0.01	0.00	-0.02	-0.01
SBI	0.01	0.02	0.00	0.00	0.03	0.00	-0.01	-0.02	-0.01	-0.01
NCML	0.03	0.04	0.08	0.02	0.06	0.04	-0.02	0.07	0.10	-0.02
PFL	0.09*	-0.02*	-0.03*	0.01*	0.00*	0.04*	0.02*	0.01*	-0.02*	0.02*
PICL	0.01*	0.01*	0.03*	-0.01*	-0.02*	0.02*	0.06*	-0.08*	0.05*	0.02*
SHL	-0.05*	-0.01*	-0.01*	0.01*	0.01	0.05	-0.04	-0.05	0.08*	0.02*
SCBL	-0.01*	0.00*	0.00*	-0.01*	0.00*	-0.01*	0.00*	0.02*	-0.01*	0.00*
TRHL	0.04	0.03	0.01	0.04	0.01	-0.01	-0.02	-0.01	0.01	-0.04
ULL	0.03*	0.03*	-0.02*	0.03*	0.06*	0.00*	0.03*	-0.01*	0.02*	-0.01*

UICL	0.01	-0.08	0.05	0.00	-0.07	-0.01	0.04	0.02	0.06	-0.04*
UFCML	0.03	-0.05	-0.03	0.00	-0.08	-0.02	-0.02	0.12	0.08	0.11

Appendix-21
Autocorrelation coefficients (Weekly returns)

Lag	1	2	3	4	5	6	7	8	9	10
NEPSE	-0.07	-0.02	0.13*	0.07*	0.00*	0.04*	0.08*	-0.04*	0.01*	0.04*
ACEFIN	-0.05	0.13	0.12	-0.02	0.02	0.05	-0.04	0.10	0.04	0.02
ANPF	0.00	-0.13	-0.02	0.02	0.24	-0.04	-0.01	0.02	-0.04	0.15
BOK	-0.10*	-0.09*	0.11*	0.07*	0.05*	0.06*	0.14*	-0.06*	0.01*	0.07*
BBC	-0.03	-0.03	0.03	0.07	-0.03	0.02	0.16	0.03	0.00	-0.05
CIT	-0.12	0.09*	-0.03	0.07	0.10	-0.08	0.12*	-0.06*	0.07*	-0.03*
EBL	-0.16*	-0.09*	0.04*	0.03*	0.00*	0.07*	-0.06*	-0.01*	0.01*	0.06*
EICL	0.05	0.00	0.07	0.05	0.05	0.03	-0.01	0.01	-0.02	-0.02
GRUL	0.14*	0.14*	0.02*	-0.02	0.00	0.09	0.05	0.16*	0.04	-0.02
HBTF	0.08	-0.15*	-0.18*	-0.07*	0.06*	-0.01*	-0.06*	0.04*	0.03	0.01
HBL	-0.09*	-0.02	-0.01	0.02	-0.01	0.00	0.01	0.03	-0.05	0.00
HGIC	0.14*	0.13*	0.14*	0.01*	0.01*	0.12*	0.04*	0.03*	-0.01	0.08
KFL	-0.09	0.00	-0.11	-0.01	-0.02	0.08	-0.04	0.03	0.03	0.07
NABIL	-0.16*	0.08*	0.01*	0.02*	0.01*	-0.03*	0.07*	-0.09*	0.00*	0.03*
NFCL	-0.14*	0.21*	-0.06*	0.06*	-0.06*	0.12*	-0.11*	0.12*	-0.06*	0.07*
NEIL	0.13	-0.02	-0.09	0.09	0.09	0.12	0.04	0.02	0.01	-0.02
NBBL	-0.07	0.02	0.01	0.05	0.10	-0.02	0.12*	-0.08*	0.02*	0.04*
NFSC	0.12	-0.02	-0.03	0.09	0.06	-0.04	0.04	0.08	0.06	0.09
NHDFC	-0.14*	0.03*	0.03	0.01	0.05	0.02	0.01	-0.03	0.07	0.00
NICL	-0.13	0.06	-0.05	0.00	-0.07	-0.05	0.15	-0.01	0.06	-0.06
NIBL	-0.09	-0.03	-0.01	0.03	0.00	0.05	0.00	-0.02	0.02	0.02
SBI	-0.03	-0.12*	0.03	0.00	-0.01	-0.02	0.01	0.01	-0.04	0.11
NCML	0.06	0.10	0.04	0.09	0.11	0.06	0.13*	0.07*	0.05*	0.12*
PFL	-0.28*	-0.07*	0.06*	0.08*	-0.12*	0.06*	0.01*	-0.03*	0.00*	0.05*
PICL	-0.06	-0.05	-0.08	0.04	0.12	-0.13*	-0.07*	0.12*	0.01*	0.01*
SHL	-0.19*	-0.06*	0.06*	-0.01	0.04	-0.02	-0.03	0.09	-0.01	-0.01
SCBL	0.01	-0.03	0.05	0.00	-0.03	-0.07	0.04	0.00	-0.06	-0.02
TRHL	-0.14*	0.02	-0.05	-0.03	-0.03	0.10	0.08	-0.03	0.03	-0.03
ULL	0.12*	0.05	0.03	0.02	-0.07	-0.02	-0.04	0.20*	0.07*	0.07*
UICL	0.00	-0.08	-0.04	0.06	-0.08	0.06	0.04	0.09	-0.04	-0.04

UFCML	0.12	-0.13*	-0.12*	0.09*	0.05*	-0.05	0.06	0.03	0.02	-0.10

Autocorrelation coefficients (Weekly returns)

Lag	11	12	13	14	15	16	17	18	19	20
NEPSE	0.02	0.04	0.08*	-0.05*	0.03*	-0.03	0.10*	-0.09*	-0.05*	0.07*
ACEFIN	0.04	0.12	-0.06	0.13	-0.03	0.07	0.09	0.12	-0.08	0.13
ANPF	0.12	-0.03	-0.16	-0.09	0.26	0.15	-0.20	-0.04	-0.03	0.04
BOK	0.07*	0.04*	0.01*	0.05*	0.06*	-0.01*	0.09*	0.00*	-0.11*	0.10*
BBC	-0.01	0.08	0.05	0.03	0.00	0.01	0.08	-0.12	0.03	0.04
CIT	-0.01	-0.01	-0.03	0.04	-0.03	0.05	0.04	0.02	0.08	-0.01
EBL	-0.02*	-0.02*	-0.04*	0.04*	0.00*	0.03	0.04	-0.04	-0.01	0.00
EICL	-0.01	0.01	-0.08	-0.01	-0.01	-0.07	-0.05	0.05	0.04	-0.03
GRUL	0.03	-0.03	0.02	-0.05	-0.05	0.02	-0.07	-0.13	-0.07	-0.09
HBTF	-0.12	0.12*	0.07*	-0.02*	-0.10*	0.00	0.08*	0.07	-0.07	-0.10*
HBL	-0.04	-0.08	0.02	0.04	-0.01	-0.04	-0.01	-0.03	0.02	-0.01
HGIC	0.05	0.12*	0.08*	0.09*	0.06*	0.01	0.06	0.08	0.00	0.05
KFL	-0.05	0.03	0.04	0.08	0.05	0.05	0.04	0.05	-0.01	0.03
NABIL	0.01*	0.02*	-0.02*	-0.04*	0.01*	-0.04	0.01	0.07	-0.03	0.00
NFCL	-0.01*	0.18*	-0.04*	0.07*	-0.02*	0.07*	-0.04*	0.05*	-0.04*	0.09*
NEIL	-0.01	0.05	0.01	0.07	-0.08	0.06	0.13	0.15	-0.04	-0.06
NBBL	0.04*	0.08*	-0.06*	0.02*	0.04*	0.04*	0.03	0.01	-0.05	0.03
NFSC	0.06	0.06	0.04	0.06	0.17	0.11	0.09	0.04	-0.04	-0.16
NHDFC	-0.02	-0.02	0.06	0.00	0.01	0.02	0.06	-0.07	0.01	0.06
NICL	0.02	-0.05	0.08	-0.01	0.08	0.01	0.01	0.02	-0.01	0.14
NIBL	-0.02	0.05	-0.01	-0.02	-0.01	0.01	-0.01	0.02	0.00	-0.05
SBI	0.05	-0.04	0.02	0.07	-0.01	0.00	-0.01	-0.07	0.05	0.00
NCML	0.14*	0.06*	0.00*	0.09*	0.03*	0.11*	0.03*	0.02*	0.08*	0.09*
PFL	0.03*	-0.07*	0.09*	0.04*	0.02*	-0.05*	0.06*	0.00*	0.02*	0.01*
PICL	-0.04*	-0.03*	0.02*	-0.10*	0.03*	0.12*	0.06*	-0.08*	-0.06*	0.03*
SHL	0.04	0.05	-0.04	0.02	0.12	-0.06	0.14	-0.09	0.03	0.04
SCBL	-0.01	-0.06	-0.03	0.04	0.00	0.04	-0.03	-0.04	-0.04	-0.02
TRHL	-0.03	0.01	0.08	-0.13	0.04	-0.16	0.06	-0.02	0.05	0.00
ULL	0.08*	0.11*	-0.03*	0.02*	-0.07*	0.05*	-0.05*	-0.03*	-0.01*	0.11*

UICL	-0.01	-0.01	-0.03	0.08	0.07	-0.05	-0.03	-0.03	0.01	0.08
UFCML	-0.03	0.06	0.13	0.09	0.07	0.03	0.05	0.05	0.00	0.07

Autocorrelation coefficients (Weekly returns)

Lag	21	22	23	24	25	26	27	28	29	30
NEPSE	0.04*	-0.02*	0.02*	0.12*	0.01*	0.08*	0.04*	0.02*	-0.03*	0.10*
ACEFIN	0.05	-0.08	0.10	-0.10	-0.04	0.23*	-0.16*	0.12*	0.08*	-0.07*
ANPF	-0.09	-0.06	-0.04	-0.16	0.03	-0.07	-0.01	-0.11	-0.25	0.06
BOK	0.11*	0.04*	0.10*	0.04*	0.01*	0.02*	0.15*	0.01*	0.03*	0.02*
BBC	0.02	0.05	-0.03	0.04	-0.01	-0.09	0.16	0.00	0.00	-0.07
CIT	0.05	-0.05	0.05	0.07	-0.08	0.02	0.11	0.06	0.03	-0.02
EBL	0.01	0.04	0.08	-0.06	0.02	-0.02	0.13*	0.01	-0.08*	0.09*
EICL	0.03	-0.02	0.06	-0.02	-0.04	0.01	0.01	-0.04	-0.06	0.03
GRUL	-0.10	-0.03	0.06	-0.02	-0.04	-0.03	-0.09	0.00	-0.01	0.04
HBTF	-0.04*	-0.03	-0.01	0.00	0.13	-0.01	-0.03	-0.02	-0.02	0.06
HBL	0.01	0.07	0.04	-0.05	0.03	-0.02	-0.04	-0.04	0.07	0.00
HGIC	0.03	-0.08	0.06	0.11	-0.04	0.08	0.03	-0.02	-0.07	-0.04
KFL	-0.06	0.12	0.03	-0.01	-0.02	0.02	-0.01	0.07	0.06	0.01
NABIL	0.02	0.08	0.00	0.01	0.01	0.04	0.07	0.04	-0.04	-0.01
NFCL	0.07*	0.07*	0.06*	0.07*	0.06*	0.00*	-0.03*	0.04*	-0.05*	0.03*
NEIL	0.04	0.09	0.03	0.10	0.01	-0.12	0.01	0.04	0.09	-0.03
NBBL	0.08	0.02	-0.02	0.01	0.04	-0.01	-0.02	0.04	0.00	-0.02
NFSC	-0.03	0.15*	-0.04*	-0.04	0.06	0.08	0.10*	-0.15*	-0.04*	0.06*
NHDFC	0.01	-0.02	0.01	-0.05	0.06	0.09	-0.01	-0.08	0.06	-0.02
NICL	-0.04	0.05	-0.03	0.02	-0.13	0.05	0.07	-0.08	0.01	0.03
NIBL	-0.02	0.01	0.01	0.01	-0.04	0.02	0.05	-0.10	-0.08	0.09
SBI	-0.01	0.00	0.08	0.00	0.02	0.03	0.06	-0.02	0.01	0.02
NCML	-0.03*	0.12*	0.09*	0.15*	0.04*	0.04*	0.07*	0.03*	0.09*	0.08*
PFL	0.04*	-0.05*	0.01*	0.06*	0.00*	0.00*	0.01*	0.01*	-0.02*	0.06*
PICL	0.06*	0.14*	-0.08*	0.05*	0.05*	0.02*	0.03*	-0.05*	-0.03*	0.01*
SHL	0.02	-0.05	0.12	0.00	-0.03	0.04	0.08	-0.01	0.03	-0.02
SCBL	-0.05	-0.06	0.03	-0.04	0.01	-0.02	0.05	0.02	-0.06	0.03
TRHL	0.00	-0.11	0.10	-0.14	0.16	0.10*	0.05	-0.09*	-0.06*	0.08*
ULL	-0.02*	0.06*	0.08*	0.09*	0.04*	-0.06*	-0.04*	-0.01*	-0.04*	0.07*

UICL	-0.06	0.06	0.09	-0.01	0.01	0.07	0.09	0.08	0.01	0.07
UFCML	0.02	-0.01	-0.06	-0.02	0.08	0.11	-0.04	0.00	0.03	-0.02

Appendix-22
Autocorrelation coefficients (Monthly returns)

Lag	1	2	3	4	5	6	7	8	9	10
NEPSE	0.16	0.18*	0.06	0.09	0.08	0.14	0.20*	0.01*	0.19*	0.06*
ACEFIN	0.00	0.09	0.20	0.11	0.11	0.07	0.05	0.04	0.05	0.17
ANPF	0.09	-0.27*	-0.08*	0.11*	0.01*	0.09	0.11*	0.09	0.02*	-0.15
BOK	0.20	0.19*	0.26*	-0.02*	0.33*	0.16*	0.21*	0.17*	-0.06*	0.14*
BBC	0.03	0.07	-0.04	0.05	-0.09	0.10	-0.12	0.18	0.03	0.15
CIT	0.04	0.05	-0.09	0.02	0.14	-0.04	0.04	0.00	0.20	0.10
EBL	-0.04	-0.03	-0.01	0.11	0.02	0.15	0.15	-0.11	0.07	-0.02
EICL	0.14	0.00	-0.02	-0.07	0.04	0.06	-0.01	-0.09	0.04	0.06
GRUL	0.03	-0.04	0.15	0.02	-0.01	0.08	0.06	-0.09	-0.04	0.07
HBTF	-0.31*	-0.01*	-0.01*	0.01*	-0.01*	0.01	0.10	-0.16*	0.10*	-0.04
HBL	-0.01	-0.08	-0.14	0.05	0.01	0.08	-0.06	0.03	0.02	0.09
HGIC	0.04	0.09	0.18	0.14	0.05	0.02	0.05	0.17	0.07	-0.04
KFL	-0.07	-0.09	0.17	0.08	0.02	0.14	0.26*	-0.12*	-0.01*	0.10*
NABIL	0.01	-0.05	0.02	0.02	0.06	0.20	0.01	0.03	-0.01	0.00
NFCL	0.04	0.11	-0.01	0.10	0.07	-0.03	-0.02	-0.01	0.05	0.15
NEIL	-0.02	0.03	0.13	0.08	-0.05	0.17	0.00	-0.06	0.13	0.05
NBBL	0.24*	0.15*	0.11*	0.10*	0.15*	0.09*	-0.03*	0.01*	0.19*	0.10*
NFSC	0.01	0.14	0.09	0.13	0.05	0.18	-0.17	0.07	-0.17	0.04
NHDFC	0.13	-0.16	0.03	0.19	0.02	-0.02	0.08	0.16	-0.05	-0.01
NICL	-0.03	-0.01	-0.17	0.09	0.01	-0.02	-0.07	0.06	0.08	0.05
NIBL	-0.06	0.06	0.05	-0.01	0.07	-0.12	0.13	-0.09	-0.04	0.08
SBI	0.01	-0.05	0.22	-0.03	-0.04	0.19	0.08	0.11	0.13	0.02
NCML	0.13	0.23*	0.17*	0.10*	0.19*	0.13*	0.15*	0.12*	0.06*	0.05*
PFL	-0.25*	-0.03*	0.04	-0.02	0.00	0.13	0.03	0.02	0.00	0.01
PICL	-0.10	-0.09	-0.08	0.14	0.19	-0.11	-0.07	0.19*	0.15*	-0.12*
SHL	-0.09	-0.03	0.09	0.03	0.01	0.08	0.05	0.10	0.10	0.05
SCBL	-0.01	-0.01	-0.07	-0.08	-0.06	-0.06	-0.06	0.05	0.24	0.01
TRHL	0.01	0.03	-0.01	-0.13	0.03	-0.02	0.00	0.25	-0.14	0.04
ULL	0.13	0.11	0.12	0.10	0.09	0.16	0.04	0.10	0.15	0.01
UICL	0.04	0.02	0.02	0.04	0.11	-0.10	0.17	0.13	0.15	-0.07

UFCML	-0.14	0.04	-0.06	0.03	0.07	-0.19	0.17	0.12	0.09	0.04

Autocorrelation coefficients (Monthly returns)

Lag	11	12	13	14	15	16	17	18	19	20
NEPSE	0.08*	-0.07*	0.12*	-0.14*	0.00*	-0.08*	-0.05*	-0.12*	-0.10*	-0.03*
ACEFIN	0.05	-0.07	0.30*	-0.05*	-0.03	-0.03	-0.04	0.12	-0.03	-0.01
ANPF	-0.06	0.09	0.17*	-0.04*	-0.06	0.04	0.00	-0.12	-0.09	0.10
BOK	-0.01*	-0.20*	0.05*	-0.06*	-0.09*	0.01*	-0.06*	-0.05*	-0.13*	-0.23*
BBC	-0.11	0.03	-0.03	0.01	-0.03	0.12	-0.01	0.03	-0.03	-0.06
CIT	0.06	0.01	-0.03	-0.03	0.03	0.01	-0.07	-0.13	0.07	0.06
EBL	0.09	-0.13	0.12	0.04	-0.01	-0.03	-0.01	-0.10	-0.03	0.06
EICL	-0.01	0.15	0.00	0.03	0.02	-0.05	-0.10	-0.11	-0.10	-0.05
GRUL	0.00	0.05	0.00	-0.03	0.04	0.00	0.04	-0.03	0.03	-0.04
HBTF	-0.03	-0.09	0.17	-0.10*	0.09	-0.13*	-0.06*	0.24*	-0.19*	0.21*
HBL	0.16	0.05	-0.13	0.04	0.00	-0.09	0.02	-0.11	-0.07	0.10
HGIC	0.11	0.03	0.01	0.02	0.10	0.10	0.02	-0.03	-0.04	0.08
KFL	0.02*	0.07	0.22*	-0.06*	-0.15*	0.18*	0.08*	-0.08*	0.01*	0.02*
NABIL	0.05	-0.08	0.16	0.03	-0.03	0.01	-0.06	-0.08	-0.10	-0.07
NFCL	0.05	0.17	0.13	0.15	-0.04	0.10	-0.05	-0.04	-0.04	-0.03
NEIL	-0.01	0.23	-0.04	-0.11	-0.10	-0.01	-0.04	-0.04	0.08	-0.12
NBBL	0.13*	0.10*	0.07*	-0.01*	0.09*	-0.08*	0.00	0.05	-0.06	0.07
NFSC	0.09	-0.06	-0.06	0.18	0.00	0.01	-0.10	0.03	-0.09	-0.13
NHDFC	-0.09	0.01	-0.08	-0.10	-0.10	0.07	-0.02	-0.06	-0.11	0.05
NICL	0.11	0.00	-0.05	0.13	-0.06	0.11	-0.03	0.00	-0.09	-0.05
NIBL	0.02	-0.06	0.00	0.02	-0.12	0.05	-0.04	0.00	-0.09	-0.02
SBI	-0.21*	0.22*	0.03*	-0.02*	0.06*	-0.05*	-0.07*	-0.07*	-0.18*	-0.02*
NCML	0.05*	-0.07*	0.16*	0.16*	0.02*	0.03*	-0.17*	0.01*	-0.18*	-0.07*
PFL	0.08	-0.04	-0.05	-0.01	-0.01	0.02	-0.09	0.08	0.02	-0.10
PICL	0.00*	0.16*	-0.06*	-0.09*	-0.18*	0.07*	0.17*	-0.23*	0.04*	0.04*
SHL	0.04	0.05	-0.12	-0.07	0.10	0.03	0.07	0.02	0.06	-0.09
SCBL	0.00	-0.09	0.04	-0.16	0.02	-0.05	0.00	0.00	-0.11	-0.11
TRHL	0.03	-0.16	0.07	-0.17	0.02	-0.04	-0.02	0.09	0.13	-0.16
ULL	-0.06	0.02	-0.05	0.04	0.15	0.04	-0.06	-0.03	0.04	0.01

UICL	0.00	-0.03	-0.02	0.00	0.03	0.07	0.03	-0.03	-0.12	-0.06
UFCML	-0.17	0.08	0.02	0.08	0.03	0.06	-0.04	-0.02	-0.01	0.01

Autocorrelation coefficients (Monthly returns)

Lag	21	22	23	24	25	26	27	28	29	30
NEPSE	-0.06*	-0.11*	-0.20*	0.02*	-0.14*	0.05*	-0.17*	-0.07*	-0.18*	-0.18*
ACEFIN	0.10	-0.09	0.09	0.02	-0.07	-0.02	-0.01	-0.05	-0.17	-0.07
ANPF	0.04	-0.03	-0.09	0.03	-0.03	-0.04	0.02	0.09	0.02	-0.07
BOK	-0.11*	-0.08*	-0.09*	0.09*	-0.14*	-0.17*	-0.16*	-0.17*	0.04*	-0.18*
BBC	-0.06	0.00	-0.01	0.07	-0.06	-0.03	0.05	-0.18	-0.18	-0.03
CIT	0.01	-0.04	-0.16	0.09	0.01	0.05	-0.21	-0.06	0.06	-0.07
EBL	0.04	-0.07	-0.04	-0.09	0.01	0.04	-0.13	-0.05	0.04	-0.05
EICL	0.09	-0.01	0.02	-0.04	-0.04	-0.02	0.05	0.11	-0.06	-0.04
GRUL	-0.06	0.06	-0.05	-0.09	0.04	-0.08	-0.15	-0.10	-0.28	0.08
HBTF	-0.17*	0.11*	-0.04*	-0.07*	0.02*	-0.10*	0.10*	-0.06*	-0.06*	0.01*
HBL	0.09	0.04	-0.16	0.01	0.11	0.01	-0.09	-0.07	-0.04	-0.06
HGIC	-0.12	0.06	0.00	-0.08	-0.09	-0.06	-0.07	-0.10	-0.06	-0.13
KFL	-0.03*	0.09*	0.06*	0.03*	-0.03*	-0.03	-0.10	0.06	0.06	-0.10
NABIL	-0.03	-0.03	-0.10	0.03	-0.09	-0.05	-0.11	-0.12	0.06	-0.08
NFCL	0.05	0.09	-0.06	0.01	0.09	0.11	-0.01	-0.03	-0.09	-0.09
NEIL	0.07	-0.11	-0.03	-0.02	-0.06	-0.16	0.07	0.06	-0.02	0.01
NBBL	0.00	-0.11	-0.12	0.05	0.03	0.00	-0.09	0.00	0.01	-0.01
NFSC	-0.02	-0.05	-0.09	-0.06	0.06	-0.03	0.04	0.06	0.06	-0.04
NHDFC	-0.08	-0.16	-0.03	0.25	0.08	-0.09	-0.05	0.20*	-0.06*	-0.09*
NICL	-0.07	0.19	-0.16	-0.08	0.06	0.16	-0.05	-0.16	-0.17	0.04
NIBL	0.06	-0.18	0.10	0.05	-0.06	-0.02	-0.12	0.18	-0.20	-0.04
SBI	0.11*	-0.07*	-0.15*	0.05*	-0.13*	-0.12*	0.00*	-0.21*	0.03*	0.02*
NCML	-0.10*	-0.11*	-0.09*	-0.10*	-0.15*	-0.17*	-0.03*	-0.17*	0.07*	-0.07*
PFL	-0.03	0.05	-0.10	-0.03	0.19	-0.13	-0.07	-0.03	-0.02	0.07
PICL	0.06*	-0.15*	-0.15*	-0.04*	0.12*	-0.01*	-0.05*	-0.08*	0.00*	-0.01*
SHL	-0.02	0.00	-0.04	-0.07	0.04	0.04	-0.06	0.04	0.06	-0.10
SCBL	0.06	-0.03	-0.05	0.12	-0.11	0.25	0.07	-0.06	-0.19	-0.04
TRHL	0.06	-0.11	-0.06	-0.09	-0.09	0.07	0.05	-0.05	0.00	-0.02
ULL	0.09	-0.10	0.03	-0.11	-0.03	-0.03	-0.05	-0.10	-0.10	-0.06

UICL	0.01	0.02	-0.08	0.08	0.03	-0.06	-0.02	-0.03	0.00	-0.06
UFCML	-0.06	-0.01	0.08	0.00	-0.09	-0.10	0.16	0.07	-0.11	-0.21

Appendix-23

Proforma of structural questionnaire: opinion questionnaire for listed companies

A Survey of Stock Market Efficiency in Nepal

Name (optional): **Institution:**
Year of incorporation: **No. of listed shares:**
Address:
No. of Branches:

1. Why did you list shares in Nepal Stock Exchange**? (Please rank the order of importance to your company by assigning 1 to most important one and so on)**.
   a. To make valuation of shares ☐
   b. To raise funds for profitable investments ☐
   c. To increase prestige and publicity of the company ☐
   d. To provided liquidity ☐
   e. To provided marketability ☐
   f. To comply the regulators' instruction ☐
   g. Others (please specify) ☐

2. What are the major benefits from listing? **(Please rank the order of importance to your company by assigning 1 to most important one and so on)**.
   a. Full and timely information on the company ☐
   b. Gaining national importance ☐
   c. Easy to obtain loans ☐
   d. Broadening and diversifying shareholding ☐
   e. Encourage institutional investors ☐
   f. Constant price quotations ☐
   g. Any tax benefit ☐
   h. Others (please specify) ☐

3. What are the disadvantages from listing shares? **(Please rank the order of importance to your company by assigning 1 to most important one and so on)**
   a. Excessive listing fees ☐
   b. Additional staff costs ☐
   c. Unnecessary intervention from regulators ☐
   d. Loss of privacy in business operations ☐
   e. Stringent supervisory burdens ☐
   f. All the above ☐
   g. None of all ☐

4. Do you think existing listing requirements need to be revised? **(Please tick appropriate box).**
   a. Yes ☐
   b. No ☐
   c. Don't know ☐

5. Which of the following listing requirements need to be revised? **(Please rank the order of importance to your company by assigning 1 to most important one and so on)**
   a. Accounting standards ☐
   b. Corporate good governance ☐
   c. Disclosure requirements ☐
   d. Compulsion on holding AGM ☐

e. Annual review of turnover ☐
f. Diversity of shareholdings ☐
g. Others (please specify)

6. How did you determine the number of shares to be issued in public floatation and amount to be raised thereof? **(Please rank the order of importance to your company by assigning 1 to most important one and so on).**
   a. Preparing long-term financial plans ☐
   b. Using experts service ☐
   c. Prescriptions from regulatory bodies ☐
   d. Others (please specify) ☐

7. Is your initial public offering over or under subscribed? **(Please tick appropriate box).**
   a. Over-subscribed ☐
   b. Under-subscribed ☐
   c. Rightly subscribed ☐
   d. Not subscribed at all ☐

8. What was your floatation cost of IPO? **(Please tick appropriate box).**
   a. 1-2% of issue ☐
   b. 2-4% of issue ☐
   c. 4-6% of issue ☐
   d. 6-8% of issue ☐
   e. 8-10% of issue ☐
   f. Over 10 percent ☐

9. How do you observe the time taken by regulatory body to process you proposal for public issue? **(Please tick appropriate box).**

Regulators	**Extremely lengthy**	**Lengthy**	**Reasonable**	**Quick**	**Very quick**
CRO					
SEBO/N					
Others (please specify, e.g. NRB, Insurance board					

10. How long does it take to transfer ownership of shares in your company? **(Please tick appropriate box).**
    a. Within 5 days ☐
    b. Within 10 days ☐
    c. Within 15 days ☐
    d. Within 1 months ☐
    e. Beyond 1 month ☐

11. How do you inform the financial position and other corporate news of your company to general investors? **(Please rank the order of importance to your company by assigning 1 to most important one and so on).**
    a. Publishing quarterly report ☐
    b. Airing programs on Radio and TV ☐
    c. Opening websites ☐
    d. Publishing annual report on AGM ☐
    e. Others (please specify) ☐

12. How long does it take to make your company's price sensitive decision to become public? **(Please tick appropriate box).**

a. 1 day ☐
b. 2 day ☐
c. 3 day ☐
d. 4 day ☐
e. More than 4 days ☐

13. How frequently you are inspected by the security Board/Nepal? **(Please tick appropriate box).**
   a. Once in a 6 month ☐
   b. Once in a year ☐
   c. Once in two years ☐
   d. More than 2 years ☐
   e. Not yet inspected ☐

14. Did the regulatory body penalize you? **(Please tick appropriate box).**
   a. Yes ☐
   b. No ☐

15. What actions have been taken against your company by regulator (s) for non-compliance? **(Please tick appropriate box).**
   a. Restriction on dividend announcement ☐
   b. Suspension of business ☐
   c. Restriction on expansion of branch ☐
   d. Removal of board ☐
   e. De-listing of shares ☐
   f. Others (please specify) ☐

16. Have you faced problems with regulator (s)? **(Please tick appropriate box).**
   a. Yes ☐
   b. No ☐

17. What are the problems of your company with regulator (s)? **(Please rank the order of importance to your company by assigning 1 to most important one and so on).**
   a. Unnecessary intervention in the business of the company ☐
   b. Imposition of impractical rules and regulation ☐
   c. Public disclosure of inside information ☐
   d. Unnecessary delay in making decisions and forwarding files ☐
   e. Less expertise in regulatory staffs ☐
   f. Highly beaurocratic behavior ☐
   g. Others (please specify) ☐

18. Do you think that current market price of your company's stock reflects true value? **(Please tick appropriate box).**
   a. Yes ☐
   b. No ☐

19. If yes, in what form it reflects? **(Please rank the order of importance to your company by assigning 1 to most important one and so on).**
   a. The intrinsic value represents future prospects of the company ☐
   b. Shares of the company are voluminously trading at current price ☐
   c. The price is relatively stable at current price ☐
   d. Others (Please specify) ☐

20. If no, what may be the reasons? **(Please rank the order of importance to your company by assigning 1 to most important one and so on).**
   a. Excessive speculations ☐
   b. Lack of expertise and professionalism ☐
   c. Infancy stage of stock market ☐
   d. Lack of information ☐
   e. Poor performance of brokers ☐
   f. Poor performance of companies ☐
   g. Others (please specify) ☐

21. Any other comments or suggestions for improving the efficiency of stock market in Nepal:
…………………………………..
………………………………….
………………………………….

Appendix-24

Proforma of structural questionnaire: opinion questionnaire for investors

A Survey of Stock Market Efficiency in Nepal

Name: (Optional) **Occupation:**
Address: **Sex:**
Age: **Qualification:**
No. of members in family:

1. How do you priorities the following investment opportunities**? (Please rank the following in order of your priority of investment by assigning 1 to most important one and so on).**
   a. Bank Deposit ☐
   b. Gold and Silver ☐
   c. Bonds ☐
   d. Shares ☐
   e. Real estate ☐
   f. Others (please specify) ☐

2. From which market you normally buy shares? **(Please tick appropriate box).**
   a. Primary market ☐
   b. Secondary market ☐

3. What was your motivation to purchase the shares initially? **(Please tick appropriate box).**
   a. Self-motivation ☐
   b. Friend's advice ☐
   c. Broker's advice ☐
   d. Neighbors/relatives suggestion ☐
   e. Attraction from company's growth and profitability ☐
   f. Others (please specify) ☐

4. How frequently do you buy or sell shares in secondary market? **(Please tick appropriate box).**
   a. Daily ☐
   b. Weekly ☐
   c. Fortnightly ☐
   d. Monthly ☐
   e. Yearly ☐
   f. Once in 2 years ☐
   g. Once in 3 years ☐
   h. Others (please specify) ☐

5. Where do you go to consult before you buy or sell the shares in secondary market? **(Please tick appropriate box).**
   a. Broker's office ☐
   b. Company's office ☐
   c. Stock exchange's office ☐
   d. Security's Board's office ☐
   e. Buyer's/seller's home ☐

f. Friends/neighbors/relatives ☐
g. Do not consult at all ☐

6. How do you instruct to buy or sell shares to your broker? **(Please tick appropriate box).**
   a. Buy or sell in prevailing market price ☐
   b. Buy or sell within a limit (or range) of price ☐
   c. Buy or sell only at a price you specified ☐
   d. Others (please specify) ☐

7. Do you specify time limit in executing orders to your broker? **(Please tick appropriate box).**
   a. Yes ☐
   b. No ☐

8. What is your normal practice of setting time limit in order form? **(Please tick appropriate box).**
   a. A day (day order) ☐
   b. A week (week order) ☐
   c. A month (month order) ☐
   d. Open date (Good-till-cancelled) ☐
   e. Left to the discretion of broker ☐
   f. Others (please specify) ☐

9. How do you arrange funds for investment in shares? **(Please tick appropriate box).**
   a. Personal savings ☐
   b. Borrowing from friends/neighbors/ relatives ☐
   c. Borrowing from financial institutions ☐
   d. Borrowing from brokers ☐
   e. Selling properties ☐
   f. Borrowing from provident fund ☐
   g. Others (please specify) ☐

10. How many shares do you buy, normally, at a time in primary market? **(Please tick appropriate box).**
   a. Less than 10 share ☐
   b. 10-20 shares ☐
   c. 20-30 shares ☐
   d. 30-50 shares ☐
   e. 50-100 shares ☐
   f. 100-500 shares ☐
   g. More than 500 shares ☐

11. How many shares do you buy, normally, at a time in secondary market? **(Please tick appropriate box).**
   a. Less than 100 shares ☐
   b. 100 and multiples of 100 shares ☐
   c. More than 100 (but not multiples of 100) shares ☐
   d. Others (please specify) ☐

12. What do you consult before buying or selling shares of a company in secondary market? **(Please rank the following in order of your priority by assigning 1 to most important one and so on).**
   a. Past price ☐
   b. Quarterly/Annual report ☐
   c. Broker's advice ☐
   d. Friends advice ☐
   e. Others (please specify) ☐

13. How do you manage the risk on share investment? **(Please tick appropriate box).**
    a. Investing in shares of different companies ☐
    b. Investing in shares of different industry groups ☐
    c. Investing in bonds and share portfolios ☐
    d. Investing in bonds, shares and bank deposits ☐
    e. Others (please specify) ☐

14. How frequently do you revise your portfolio? **(Please tick appropriate box).**
    a. Frequently ☐
    b. Often ☐
    c. Seldom ☐
    d. As an when required ☐

15. Do you consider risk while investing in shares? **(Please tick appropriate box).**
    a. Yes ☐
    b. No ☐
    c. Don't know ☐

16. How do you consider the risk while investing in shares? **(Please rank the following in order of your priority by assigning 1 to most important one and so on).**
    a. Study of earnings fluctuations ☐
    b. Study of company's borrowings ☐
    c. Changes in government policies ☐
    d. Fluctuation in market price of shares ☐
    e. Frequency of changes in the management of the company ☐
    f. Others (please specify) ☐

17. What would be your reaction in terms of buying or selling shares in the following situation: **(Please tick appropriate box).**

SN	Situation	Buy	Sell	Don't trade
1	The company is likely to announce cash dividend.			
2	The company is likely to announce bonus shares.			
3	The company is likely to announce right share issue.			
4	The company is likely to announce public issue of new shares.			
5	The company's quarterly report shows decline in profits.			
7	The company and board members of the company are black listed by Credit Information Beauro (CBI).			
8	The company launches new product in the market.			
9	The company issues bond in the market.			
10	Nepal Rastra Bank increases the discount rate.			

18. How do you get information to specify the price on order form? **(Please tick appropriate box).**
    a. Stock Exchange bulletin ☐
    b. Broker's advice ☐
    c. Friend's advice ☐
    d. Company analysis ☐
    e. Others (please specify) ☐

19. Were your orders executed at the price you specified in order form? **(Please tick appropriate box).**
    a. Frequently ☐

b. Often ☐
c. Seldom ☐
d. Never ☐

20. Were your orders executed at your specified quantity? **(Please tick appropriate box).**
a. Frequently ☐
b. Often ☐
c. Seldom ☐
d. Never ☐

21. In your experience, how long does it take to get stock certificates after transaction is complete? **(Please tick appropriate box).**
a. Within 5 days ☐
b. 5-10 days ☐
c. 10-20 days ☐
d. 20-30 days ☐
e. Over 30 days ☐

22. How do you make or get payment with brokers? **(Please tick appropriate box).**
a. In cash ☐
b. Opening account with brokers ☐
c. Through bank clearance ☐
d. Through credit card ☐
e. Others (please specify) ☐

23. In your investment history, how many brokers do you have dealt with? **(Please tick appropriate box).**
a. One ☐
b. Two ☐
c. Three ☐
d. Four ☐
e. Five and more ☐

24. What are the reasons of dealing with more than one broker? **(Please rank the following in order of your priority by assigning 1 to most important one and so on).**
a. The broker was not good ☐
b. To share the experience of different brokers ☐
c. To get more information ☐
d. To get benefit from the competitive brokers market ☐
e. To minimize the chance of cheating from the single broker ☐
f. Others (please specify) ☐

25. Did you borrow amount from banks and financial institutions by pledging shares? **(Please tick appropriate box).**
a. Yes ☐
b. No ☐

26. How far you are aware regarding the following rights of the shareholders? **(Please make a tick–mark at the appropriate number as per the following scale:**
1 = Very aware 2 = Aware 3 = don't know 4 = Not aware 5 =Not aware at all

SN	Shareholders' rights	1	2	3	4	5
1	Right to receive share certificate in due time.					
2	Right to receive annual report before the AGM.					
3	Right to vote on the motions					

	presented in the AGM.					
4	Right to vote to elect the member of the Board.					
5	Right to inspect the share register book in corporate office.					
6	Right to receive dividends as declared by the company.					
7	Right to become a candidate for the member of the Board.					
8	Right to apply for conducting AGM if the company denied holding it within specified time.					
9	Right to sell shares you owned at any time.					

27. Any other suggestions or comments to improve the efficiency of Nepalese stock market:

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Appendix-25

List of responding organizations*

S N	Name of the institution	Address of head office
01.	Nabil Bank Limited	Kamaladi, Kathmandu
02.	Nepal Credit and Commerce Bank Ltd.	Bagbazar, Kathmandu
03.	Standard Chartered Bank Nepal Limited	New Baneshwar, Kathmandu
04.	Himalayan Bank Limited	Thamel, Kathmandu
05.	Nepal SBI Bank Limited	Hattisar, Kathmandu
06.	Everest Bank Limited	Lazimpat, Kathmandu
07.	Bank of Kathmandu Limited	Kamaladi, Kathmandu
08.	Nepal Industrial and Commercial Bank	Main Road, Biratnagar
09.	Machhapuchhre Bank Limited	New Road, Pokhara
10.	Laxmi Bank Limited	Hattisar, Kathmandu
11.	Kumari Bank Limited	Putalisadak, Kathmandu
12.	Lumbini Bank Limited	Darwarmarg, kathmandu
13.	Nepal Industrial Development Corporation	Darwarmarg, Kathmandu
14.	Development Credit Bank Limited	Kamaladi, Kathmandu
15.	Nepal Vikash Bank Limited	Kamladi, Kathmandu
16.	Sanima Vikas Bank Limited	Nagpokhari, Kathmadu
17.	Nirdhan Utthan Bank Limited	Shiddharthnagar, Rupandehi
18.	Nepal Finance and savings Company Ltd.	Kamaladi, Kathmandu
19.	NIDC capital Markets Limited	Kamalpokhari, Kathmandu
20.	National Finance Company Limited	New Road, Kathmandu
21.	Nepal Share Markets and Finance Limited	Ramshahpath, Kathmandu
22.	Annpurna Finance Company Limited	Chipledunga, Pokhara
23.	Kathmandu Finance Limited	Dillibazar, Kathmandu
24.	People's Finance Limited	Tripureshwar, Kathmandu
25.	Union Finance Limited	Gyaneshwor, Kathmandu
26.	Citizen Investment Trust	Putalisadak, Kathmandu
27.	Nepal Aawas Vikash Bitta Company Limited	New Baneshwar, Kathmandu
28.	Narayani Finance Limited	Narayan Ghat, Chitwan
29.	Ace Finance Company Limited	Narayanchaur, Katmandu
30.	Gorkha Finance Company Limited	Hattisar, Kathmanu
31.	Samjhana Finance Company Limited	Banepa, Kavre
32.	Universal Finance Company Limited	Kantipath, Kathmandu
33.	Nepal Housing and Merchant Finance Co. Ltd.	Dillibazar, Kathmandu
34.	General Finance Company Limited	Chabhil Kathmandu
35.	Mahalaxmi Finance Company Limited	Birgunj, Parsa
36.	Lalitpur Finance Company Limited	Lagankhel, Lalitpur
37.	Goodwill Finance Company Limited	Dillibazar, Kathmandu
38.	Paschimanchal Finance Company Limited	Butwal, Rupandehi
39.	Pokhara Finance Company Limited	Pokhara

40.	Lumbini Finance and Leasing Company Ltd.	Thamel, Kathmandu
41.	Shidhartha Finance Limited	Sidharthanagar, Bhirawa
S N	**Name of the institution**	**Address of head office**
42.	Nepal Merchant Bank and Finance Limited	Darwarmarg, Kathmandu
43.	Alpic Everest Finance Company Limited	Kathmandu Mall, Kathmandu
44.	International Leasing and Finance Company Ltd.	New Baneshwar, Kathmandu
45.	Everest Finance Limited	Bhairwa, Rupandehi
46.	Royal Merchant Banking and Finance Limited	Darwarmarg, Kathmandu
47.	United Finance Limited	Darwarmarg, Kathmandu
48.	Shree Investment and Finance Company Ltd.	Dillibazar, Kathmandu
49.	Central Finance Company Limited	Kupondol, Lalitpur
50.	Premier Finance Company Limited	Manbhawan, Lalitpur
51.	Navadurga Finance Company Limited	Itachhe, Bhaktpur
52.	Janaki Finance Company Limited	Janakpur
53.	Standard Finance Limited	Kamalpokhari, Kathmandu
54.	Om Finance Company Limited	New Road, Pokhara
55.	Cosmic Merchant Banking and Finance Limited	Darwarmarg, Kathmandu
56.	Fewa Finance Limited	BP Chauk, Pokhara
57.	Kist Merchant Banking and Finance Limited	Anamnagar, Kathmandu
58.	Birgunj Finace Limited	Adarshngar, Birgunj
59.	Nepal Sri Lanka Merchant Bank Limited	Kamaladi, Kathmandu
60.	Rastriya Beema Sansthan	Ramshahpath, Kathmandu
61.	Nepal Insurance Company Limted	Kamladi, Kathmandu
62.	Himalayan General Insurance company Limited	Maitighar, Kathmandu
63.	United Insurance Company Limited	Darwarmarg, Kathmandu
64.	Everest Insurance Company Limited	Hattisar, kathmandu
65.	Premier Insurance company Limited	Tripureshwar, Kathmandu
66.	Sagarmatha Insurance Company Limited	Kamaladi, Kathmandu
67.	Life Insurance Corporation (Nepal) Limited	Kamaladi, Kathmandu
68.	Lumbini General Insurance Company Limited	Thamel, Kathmandu
69.	Alliance Insurance Company Limited	Darwarmarg, Kathmandu
70.	Prudential Insurance Company Limited	Putalisadak, Kathmandu
71.	Hotel Yak and Yeti Limited	Darwarmarg, Kathmandu
72.	Soaltee Hotel Limited	Tahachal, Kathmandu
73.	Oriental Hotels Limited	Lazimpat, Kathmandu
74.	Gorakhkali Rubber Udyog Limited	Kalimati, Kathmandu
75	Butwal Dhago Karkhana Limited	Kalimati, Kathmandu
76.	Jyoti Spinning Mills Limited	Kathipath, Kathmandu
77.	Himalayan Distillery Limited	Jawalakhel, Lalitpur
78.	Unilever Nepal Limited	Kamaladi, Kathmandu
79.	Harisidhhi Brick and Tile Factory Limited	Harisidhhi, Lalitpur
80.	Bishal Bazaar Company Limited	New Road, Kathmandu

81.	Salt Trading Corporation Limited	Kalimati, Kathmandu
82.	National Productivity and Economic Dev. Center	Balaju, Kathmandu
83.	Nepal Film Development Company Limited	Balaju, Kathmandu

Depository institutions include S.No. 1-59 and remaining 24 (S.No. 60-83) institutions are non-depository institutions.

Appendix-26

List of companies included in five portfolios

S.N.	Name of the companies	Portfolio
1	Ace Finance Company	1
2	Kathmandu Finance Limited	1
3	Peoples Finance Limited	1
4	Nepal Housing and Development Finance Limited	1
5	Nepal Finance and Savings Company Limited	1
6	Universal Finance and Capital Markets Limited	1
7	Annapurna Finance Company Limited	2
8	Harisidhhi Brick and Tile Factory Limited	2
9	Himalayan General Insurance Company Limited	2
10	NIDC Capital Market Limited	2
11	Citizen Investment Trust	2
12	Premier Insurance Company Limited	2
13	Everest Insurance Company Limited	3
14	Gorakhkali Rubber Udyog Limited	3
15	Neco Insurance Company Limited	3
16	National Finance Company Limited	3
17	Nepal Insurance Company Limited	3
18	United Insurance Company Limited	3
19	Bishal Bazar Company Limited	4
20	Bank of Kathmandu Limited	4
21	Everest Bank Limited	4
22	Nepal SBI Bank Limited	4
23	Soaltee Hotel Limited	4
24	Taragaon Regency Hotel Limited	4
25	Nabil Bank Limited	5
26	Nepal Bangladesh Bank Limited	5

27	Nepal Investment Bank Limited	5
28	Himalayan Bank Limited	5
29	Standard Chartered Bank Limited	5
30	Unilever Nepal Limited	5