CHAPTER III
REVIEW OF EARLIER STUDIES

Risk and return play an important role in making an investment decision. One basic premise regarding risk and return is that investors prefer returns to risk. People invest in riskier assets only if they expect to receive more than average returns. It is an attempt to analyze the opportunities that are available for investors as far as returns are concerned and the involvement of risk thereof while investing in the equity of firms belonging to different sectors of the Indian economy.

Risk and return in any business are influenced by certain decision and non-decision variables. The decision variables are those on which investors can take decision such as deciding what the product prices are to be charged, capital structure decision, dividend policy decision, etc. The non-decision variables are those which are imposed on investors and on which they have no control. All macro-economic variables such as Gross Domestic Product (GDP) growth rate, inflation rate, unemployment rate, direct and indirect tax rates are the non-decision variables which are imposed on the investor either by policy makers or by the macro-economic environment.

An efficient market is best represented by the existence of equilibrium in asset pricing through positive risk-return relationships. The risk of a security is nothing but the likelihood of the return turning out to be more or less than the expected. The total risk of an asset may be perceived as being the sum of several different contributing risk factors, like interest rate fluctuations, market cycles, purchasing power instability and so on.

Many studies have been conducted by the researchers and various agencies to evaluate the risk-return relationship of equity shares with different objectives. A brief review of the earlier studies, national and international status,
is given below under (i) Studies on risk-return relationship(ii) Beta as a measure of risk; and (iii) Efficient market hypothesis (EMH).

### 3.1 Studies on Risk-Return Relationship

Gupta (1981)\(^1\) examined the characteristics of the rates of return on equities in the Indian capital market for a large sample of 276 companies from Bombay, Calcutta and Madras Stock Exchanges over a 16 year period from 1961 to 1976. It is concluded that the rate of return provided by equities are unsatisfactory because 20% of the returns for various holding periods are negative. The returns provide only a partial hedge against inflation and the fluctuations in returns even within a year are large enough to conclude that time has an important bearing on realized return. The risk is considerable even when investment is made in a portfolio of securities and for long periods of time.

Gupta (1981)\(^2\), studied share price data between the period of 1960-76, a total 606 equity shares for one or more holding periods were considered, taken from Bombay, Calcutta and Madras Stock Exchanges. The long term rates on equities were less than that of debentures, preference shares, company deposits and long term bank deposits most of the time. It is further revealed that equities providing hedge against inflation are found to be redundant and they are doubtful about the validity of CAPM in Indian capital market.

Srivastava (1984)\(^3\), conducted a cross-sectional study of 327 firms of Bombay Stock Exchange for the year 1982-83, and concluded that high dividend rates were associated with higher market prices of securities. The study rejected the MM approach of negative importance of dividend in explaining the rates of return in Indian context.

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\(^2\) Ibid.

Bhole and Rao (1987)\textsuperscript{4}, conducted a study to estimate and analyze the rate of return on equity shares in India during the period 1953 to 1987 on 32 industries listed in five stock exchanges in India. In order to test the risk-return relationship, the return on nine financial and physical assets were estimated and found that the return on the aggregate market was commensurate with the risk. It was highly variable over one year periods, but it decreased with increase in holding period.

Sreenivasan (1988)\textsuperscript{5}, empirically tested the validity of CAPM in India with stock prices of 85 firms selected from Calcutta and Bombay Stock Exchanges during the period July 1982 to October 1985. Economic Times Index of ordinary shares were considered as market proxy and found that CAPM relationship was valid.

In an attempt to utilize the relationship expressed between the return and the beta, explained under CAPM model, Yalawar(1988)\textsuperscript{6} conducted a study in Indian environment. Considering the monthly returns for 20 years from 1963 to 1982 relating to 239 stocks regularly traded in Bombay Stock Exchange, the study has tested the excess returns version of the market model. Further the study has tested the statistical significance of the beta estimate to establish it to be explanatory variables for security returns. The results lend supports for the applicability of CAPM and as a good descriptor of security returns in the Indian equity market.

Sharma (1989)\textsuperscript{7}, has made a study in Indian context to identify the factors affecting the relative prices of equity shares. Considering a sample of 30 cotton textile units for a period of 1976 to 1980, based on Bombay Stock Exchange, the

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study has developed separate log linear annual regression equation for relative price of equities as dependent on dividend pay-out, growth, capitalization rate and variability in market prices per share and such other factors. The cross-sectional regressions establish the dividend payout, growth and size of the firm as significant variables.

Ramachandran (1989)\(^8\), examined the monthly share prices of 132 actively traded scrips of Bombay Stock Exchange in a period from January 1979 to December 1986. He found that the CAPM was rejected with the Indian data.

Zahir (1992)\(^9\), conducted a study to establish certain internal and external factors which had a bearing on market prices of shares in India. Complete information of 140 companies for the period 1985 to 1987 were collected from Business India, BSE Directory and RBI Bulletins. The variables considered were, average share price, bonus issue, size, growth in assets, earnings per share, book value per share, yield, variability in market price, RBI Security index, money supply and time factor. The empirical results of the study found that selected independent variables together were able to explain as much as 67% variation in the market prices of more volatile shares and only 29% of the variation of equity prices in case of less volatile group.

Gupta and Sehgal (1993)\(^{10}\), studied CAPM over the period April 1979 to March 1989. They employed 30 stocks forming BSE Sensex and used portfolio method of constructing three equally- weighted and three value- weighted portfolios. They explicitly admitted the question of nonlinearity and role of residual risk in explaining returns. They concluded that CAPM did not seem to be a suitable descriptor of asset pricing in the Indian capital market during the study period. The risk-return relation over the period is positive but weak.

Ray (1994)\(^{11}\), conducted a test of CAPM using 170 actively traded scrips on Bombay Stock Exchange. The study used monthly share price data over the period 1980-91. RBI Index, ET Index and the Sensex were used as market proxy’s. While applying Fama, MacBeth methodology, they found that CAPM did not seem to hold for the Indian capital market.

Obaidulla (1994)\(^{12}\) studied monthly prices of 30 stocks from Bombay Stock Exchange for sixteen years during the period 1976 to 1991. The Coefficient of Beta was found to be not statistically significant. This was in conformity with the CAPM, but in the multiple regression model the coefficient of portfolio beta in most cases also became statistically insignificant which was contrary to the CAPM. It is concluded that CAPM as a description of asset pricing in Indian market does not seem to rest on solid grounds.

Sehgal (1994)\(^{13}\), analyzed the data of 80 individual securities from BSE Natex during the period from April 1984 to March 1993, using logarithmic price changes. It was found that Natex skweness was not significant but kurtosis was significant. For individual securities, majority had significant positive kurtosis.

Rao and Jose (1996)\(^{14}\), conducted a study to examine the explanatory power of different risk variables on security returns of 71 companies, listed on Bombay Stock Exchange during the period 1975 to 1991. Using time series cross sectional regression across the period, size, dividend policy, leverage ratio, productivity, liquidity ratio, profitability, accounting beta, earnings growth and earnings variability and price-earnings ratios were found to be consistent in all equations with significant coefficients. The evidence supports CAPM and Arbitrage Pricing Technique models in India.

Madhusoodanan (1997)\textsuperscript{15}, carried out a study on a sample of 120 scrips traded on the Bombay Stock Exchange pertaining to the period January 1987 to March 1995. In order to check the sensitivity of the result to the choice of index, the study employed both BSE Sensex and Natex. The analysis did not find any positive relationship between beta and return. The study showed that maximum risky portfolio gave the minimum return while the minimum risky portfolio yielded comparably higher returns.

Ansari (1997)\textsuperscript{16}, investigated the CAPM applicability and the data used in the sample consisted of 96 stocks listed on the BSE over the period January 1990 to December 1996. The return on Bombay Stock Exchange sensitive Index was taken as a proxy for return on market portfolio and the term deposit rates with commercial banks were used as a surrogate for risk-free rate. Five equally weighted portfolios were created out of these stocks. The results of the study stated no validity of CAPM in Indian context.

Mohanty (2001)\textsuperscript{17}, attempted to find out whether the returns generated by small stocks was higher compared to those of large stocks. Data on all the companies from Indian stock market have been collected from the Prowess database of CMIE during the period September 1991 to March 2000. Using Fama and MacBeth regression, it is found that size is negatively related to the average stock return in the sample period.

Navin (2003)\textsuperscript{18} conducted an empirical test of CAPM by using the weekly data of 30 stocks traded in the Bombay Stock Exchange during 1999, from all sectors of industries. The evidence from the tests shows a strong positive relation between individual stock’s excess return and market index for the period. It is

also evident that the value of beta is highly significant in all securities. The value of $R^2$ informs the highly explanatory power. The evidence strongly supports the CAPM in Indian context.

An empirical study, for an adjusted sample of 364 companies from June 1989 to March 1999 forming part of CRISIL-500 index, was carried out by Sehgal and Kumar (2004)\(^\text{19}\). Using both market based as well as non-market based measures of company size, the study concluded that there was a strong size effect in the Indian stock market. They also detected a weak value effect in stock returns, especially when price-earning ratio was employed as a relative distress proxy.

Mohamed and Devi (2004)\(^\text{20}\), investigated the risk-return relationship under CAPM in Indian stock Market, considering a sample of 200 shares of Bombay Stock Exchange from April 1991 to March 2003. Using Regression Model, the study concludes that the return is just equal to T-bill rate. Hence, Sharpe-Linters’ CAPM is not relevant to Indian capital market.

Sehgal and Tripati (2005)\(^\text{21}\), conducted a study to test the size effect in Indian stock market. The data comprised of top 482 Indian companies listed in Bombay Stock Exchange for the period 1990-2003. They found a strong size premium using six alternative measures of company size, namely, market capitalization, enterprise value, net fixed assets, net annual assets, total assets and net working capital. Size based investment strategy seemed to be economically feasible as it provided extra normal return on risk adjusted basis.


Banerjee and Sarkar (2006)\textsuperscript{22}, conducted a study on modeling the daily volatility of NSE Nifty for the time from 1\textsuperscript{st} June 2000 to 30\textsuperscript{th} January 2004. The results of GARCH model showed the existence of volatility clustering in Indian stock market. Evidence of leverage effect on volatility, change in volume of trade positively affecting market volatility and participation of Foreign Institutional Investments in the Indian stock market did not result in any significant increase in market volatility.

Raj and Rakesh (2006)\textsuperscript{23}, analysed the relationship between risk and return and the effect of diversification on non-market risk in Indian stock market by applying Market Index Model. Monthly adjusted share prices of 100 companies from Bombay Stock Exchange for the period from 1996 to 2005, were considered and the results reported a high positive correlation between portfolio return and risk.

Manjunatha and Others (2007)\textsuperscript{24}, conducted a test on CAPM to find intercept, beta and a number of risk factors, during the period 1990 to 2005 for 66 companies listed in Bombay Stock Exchange. Their study found that intercept was not significantly different from zero and neither beta nor size explained the variation in portfolio returns. The conclusion was that the intercept of the CAPM was equal to the risk-free rate of returns but the beta and size factors did not explain the portfolio returns in Indian market.

Shijin and Others (2007)\textsuperscript{25}, examined the risk-return characteristics of common stocks in Indian stock market for the period from March 1996 to March

2006 for a sample of 72 companies from Bombay Stock Exchange. The results of Vector Autoregressive Model indicated that market risk proxy had persistent effects on stock returns in Indian market.

Sangeetha and Dheeraj (2007)\(^{26}\), studied the risk and return relation of different sectors of the Indian economy using both the market and accounting based information. Monthly data of Bombay Stock Exchange sectoral indices were collected from ‘Prowess’ and BSE100 index was used as market proxy, for a period from 1999 to 2006. The results of the regression model showed that the entire risk computed on the basis of accounting information was not significantly captured by the market. It was only the financial risk which was significantly captured by the market.

Singla (2008)\(^{27}\), examined whether the CAPM offered an appropriate explanation of stock returns in the Indian Capital Markets and whether higher risk brought higher level of returns. The study consisted of 320 actively traded scrips listed on Bombay Stock Exchange. Month-end share prices were used to compute the returns for the period from 1998 to 2004. Using regression analysis, it was found that the results were consistent with the general observation of the validity of the model in Indian Stock Markets.

Ahmed (2008)\(^{28}\), investigated the nature of the causal relationship between stock prices and the key macro-economic variables representing real financial sector of the Indian economy for the period 1995 to 2007 using quarterly data. The variables used were Indian industrial production, exports, foreign direct investment, money supply, exchange rate, interest rate, National Stock Exchange Nifty and Bombay Stock Exchange Sensex. Johansen’s Co-

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integration and Toda and Yamamoto Granger Causality tests were applied and found that the stock prices in India led to economic activity except movement in interest rate.

Singhania (2008)$^{29}$, studied the determinants of Indian equity prices during the period 2000 to 2007, for a sample of 51 manufacturing companies listed on the Bombay Stock Exchange. The results of the multiple regression analysis of the explanatory variables showed that book values, earning per share and price-earning ratio were significant whereas dividend cover and yield were insignificant with negative value. Growth and dividend per share were insignificant but positive.

Vanita (2009)$^{30}$, examined the relationship between company fundamentals, namely, size, leverage, price-earnings ratio and book to market equity ratio, and returns in India. 455 listed companies in Bombay Stock Exchange during the period June 1977 to June 2007 were considered. The results showed that there was positive but low relationship between size and price-earnings ratio. There was negative but low relationship between size and debt-equity ratio; and book to market equity ratio.

Kumar and Gupta (2009)$^{31}$, examined the volatility of individual stocks listed at National Stock Exchange using daily closing prices of 29 select companies from S&P CNX Nifty covering the period from 1996 to 2007. The study concluded that most of the companies were highly volatile with low or even negative return.

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Broca (2009)\textsuperscript{32}, used 2261 daily closing values of the Bombay Stock Exchange sensitive index of equity prices over the period from 1\textsuperscript{st} July 1997 to 31\textsuperscript{st} March 2008, analyzed the distributional characteristics of Indian stock returns. Empirical results showed that there was severe leptokurtosis and slight negative skewness.

Kapil and Sakshi (2010)\textsuperscript{33}, examined the Capital Asset Pricing Model (CAPM) for the Indian stock market using monthly stock returns of 278 companies of BSE 500 Index, for the period from January 1996 to December 2009. The findings of the study did not substantiate the theory’s basic result that higher risk (beta) was associated with higher levels of return.

Madhu and Tamimi (2010),\textsuperscript{34} examined the application of CAPM in estimating the systematic risk and expected return. A sample of 60 companies in drug industry from BSE during the period from 2001 to 2007 was selected. The regression results of the study revealed that CAPM did hold good in Indian stock market in explaining the systematic risk and establishing the tradeoff between risk and return.

Mazen Diwani (2010),\textsuperscript{35} examined the validity of the CAPM model in the emerging markets. The Indian market, Bombay Stock Exchange Sensex, was chosen for the study. 28 listed companies were selected during the period from November 2004 to October 2009. The test result did not show any strong evidence supporting the validity of the model in the entire and different sub-periods of the study.

Review of earlier studies conducted abroad regarding the risk-return relationship and CAPM is presented below:

In order to establish the positive risk-return relationship between equity returns and different distributional and financial risk variables, Arditti, (1967)\textsuperscript{36} made an early-study considering the firms listed in the Standard&Poor’s Composites Index from 1946 to 1963. The risk variables considered in the study were broadly divided as (a) those that directly associated with the probability distributions of returns of firm’s stock, (b) those variables which were intertwined with the firm’s financial policies. Having constructed cross-sectional and stepwise multiple regressions across all firms as well as industry categories, the study observed that the variables like the second and third moments of the probability distributions were reasonable risk measures while the market correlation did not. Further, supporting the investors liking for high dividend payout, the dividend earnings ratio showed negative significance. The debt-equity ratio resulted in negative sign to represent the fact that the shareholder liked use of debt in the capital structure and accepted a lower return from the firm which carried debt.

While attempting to study the factors affecting the rates of return, Nerlov (1968),\textsuperscript{37} conducted a study on 800 companies from Standard &Poor’s Compustat File for the period from 1950 to 1964. It was observed that sales, retention of earnings and growth in earnings were found to possess relationship with returns. Over long holding periods both dividend and leverage found to possess significant relationship, the latter showing a positive association with the rate of return. The study further observed that a group of possible variables, assets growth, inventory turnover, cashflows and liquidity ratios proved to be redundant in explaining the returns.

Evans and Archer (1968)\textsuperscript{38}, made an attempt to empirically verify the portfolio algorithm suggested by Sharpe in 1963. 470 scrips listed in Standard & Poor’s Index for the period 1958-1967 were considered and constructed 40 random portfolios with sizes ranging from 1 to 40 securities. The regression equation confirmed the expected relationship and the results established this relationship to take a form of rapidly decreasing function with the level of systematic variation in the market.

Beaver and Others (1970)\textsuperscript{39}, undertook the task of investigating the real determinants of the systematic risk by considering variables like dividend payout, growth, financial leverage, liquidity, size, earnings variability and earnings beta. They tested the relationship between these variables and beta by cross-sectional tests on a sample of 307 firms, from CRSP Tape, for which complete accounting and stock prices data were available for the period of 1945-1965. The results showed that ‘leverage’ and ‘accounting beta’ found to possess strong positive correlation and earning variability and payout to have significant correlation in the expected direction. However, the size exhibited a weaker correlation.

To test the stock market as an efficient ‘pricer’ of risk, Black, Jenson and Scholes (BJS1972)\textsuperscript{40} divided all New York Stock Exchange stocks into ten portfolios in each year from 1931 to1965. Their study found that higher returns were obtained from more risky portfolios; however, they also found that low risk stocks seemed underpriced, while high risk stocks seemed overpriced.


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Gonedes (1973)\(^{41}\), provided additional and somewhat discouraging evidence on the importance of the ‘accounting beta’ as a determinant of firm’s stock ‘beta’. The study conducted with a random sample of 99 firms, listed on NYSE, for the period 1946-67. The study analyzed the correlation between stocks beta and accounting beta measured in terms of scaled net income and found no significant relationship for different sub-periods for which the results worked out.

Fama and Macbeth (1973)\(^{42}\), conducted series of empirical works to test the relationship between average returns and the risk for New York Stock Exchange common stocks covering a period of January 1926 to June 1968 with monthly percentage returns of 1000 securities. The theoretical basis of these tests were the ‘Two-Parameter’ portfolio models of Tobin, Markowitz and Fama and models of market equilibrium derived from the two parameter model. The study observed a positive trade-off between returns and risk, with the risk measured from portfolio view point.

Francis (1975)\(^{43}\), made an evaluation study by considering the quarterly rates of returns for 113 large U.S Mutual Fund companies during 1960-68. The study constructed step-wise regression to include two important distributional risk variables, viz., ‘standard deviation’ and ‘skewness’. It observed that while standard deviation as a measure of risk found to possess positive sign for its coefficients, the coefficient of skewness was found not significant. It indicated that the investors did not consider skewness in making their investment decision.


Ben and Shalit (1975)\textsuperscript{44}, conducted an empirical test with the relationship between the firms risk and its leverage, size and dividend record, used 1000 largest US Industrial Corporations in 1970 from the fortune directory. The regression results showed that firm’s size and leverage were important determinants of its risk and the dividend record proved to be a significant determinant of the firms equity risk.

Lee (1976)\textsuperscript{45}, conducted a study to improve the explanatory power of CAPM to test whether the risk –return relationship was linear. The study used the likelihood ratio method and the CES(Constant Elasticity of Substitution) function method to introduce the parameter for reducing the bias of the systematic risk. Results based on 75 randomly selected NYSE securities during 1967 to 1972 revealed that one-third of the individual securities and two-third of the random portfolios should employ the non-linear instead of linear CAPM to improve the explanatory power of capital asset pricing.

Basu (1977)\textsuperscript{46}, found in the study of 1400 Industrial Firms from the Compustat File of NYSE during the period from September 1956 to August 1971, that stocks with low price-earning ratios had higher average returns than stocks with high price-earning ratios.

Hagerman (1978)\textsuperscript{47}, examined the distribution of security returns during the period from 14\textsuperscript{th} August 1962 to the end of 1976 for 2586 individual securities listed in the New York and American Stock Exchanges. The daily security return data were collected from CRSP tape. The evidence indicated that AMEX and NYSE securities had approximately the same average characteristic exponent. It was not consistent with the stable symmetric hypothesis.

\textsuperscript{44} Uri Ben-Zion and Sol S. Shalit(1975), “Size, Leverage and Dividend record as determinants of Equity Risk”, Paper No. 75-53, April, Centre for Economic Research, University of Minnesota.
Masulis (1983)\(^{48}\) in a cross sectional study of 133 exchange offers, listed in NYSE, made between 1963 and 1978 in United States, concluded that changes in stock prices were positively related to leverage changes because of (a) a gain in value induced by tax shields on debt and (b) a positive information effect from higher leverage.

Bhandari (1988)\(^{49}\), examined the data from Compustat File, NYSE, from 1948 to 1981 for an average sample of 728 stocks, and found that the expected common stock returns were positively related to the ratio of debt (non-common equity liabilities) to equity, controlling for the beta and firm size and including as well as excluding January, though the relation was much larger in January. This relationship was not sensitive to variations in the market proxy, estimation technique, etc. The evidence suggested that the "premium" associated with the debt-equity ratio was not likely to be just some kind of "risk premium".

Ou and Penman (1989)\(^{50}\), documented the existence of significant abnormal return to a trading strategy that was based on the prediction of the sign of future changes in annual earnings per share (EPS) for a large sample of 29,958 NYSE firms for the period 1973 to 1983 from Compustat Files. They concluded that fundamental analysis works in the sense that identified equity values not currently reflected in stock prices and thus produced abnormal returns.

Handa and Others (1989)\(^{51}\), examined the behavior of beta as a function of return measurement interval and tested whether the size effect tests were sensitive to beta estimation. Based on the sample included, all stocks listed on


CRSP monthly tape of NYSE for a period from 1964 to 1982, 20 market value portfolios were constructed. It was observed that the beta of such portfolios changed with the return interval due to the fact that an asset return was in co-variance with the market return and the market return’s variance might not change proportionately to the varying return intervals. Betas of high risk securities increased with the return interval whereas the betas of low risk securities showed the other way around. The regression of returns on monthly and annual betas and the firm size to examine the implication of the size effect tests, suggested that only annual betas explained return variation incrementally and the co-efficient of firm size variable was insignificant.

Fama and French (1992)\textsuperscript{52}, used all non-financial firms in the CRSP and Compustat Files during the years 1962 to 1989 and indicated that the book to market ratio had the strongest relation with expected stock returns in the United States.

Kwon and Others (1997)\textsuperscript{53}, conducted a study on the behavior of stock market and various macro economic variables for South Korean stock markets for the period of January 1980 to December 1992. Monthly returns of the value weighted Korea Composite Stock Price Index (KOSPI) were used to calculate monthly returns. The independent variables consisted of production index, inflation and expected inflation, risk premium, term structure, dividend yield, trade balance, foreign exchange rate, oil price and money supply. The result showed that the Korean stock market was more sensitive to real economic and international trading activities.


Andor and Others (1999)\textsuperscript{54}, empirically tested CAPM in the Hungarian Capital Market based on monthly data of 17 Hungarian companies listed in Budapest Stock Exchange from the period 3\textsuperscript{rd} July 1991 to 1\textsuperscript{st} June 1999. The results showed a positively correlated relationship between the beta’s and returns. Thus, the CAPM seemed to be appropriate in measuring the risk of a portfolio, the total deviation of actual return from the expected returns was considered. In order to surrogate the total risk of a security or portfolio the commonly used measure was the variance or standard deviation of returns.

Gompers and Others (2003)\textsuperscript{55}, empirically tested 1500 firms from S&P’s list of NYSE and AMEX during the year 1990, and concluded that a significantly positive impact was made on equity prices if positive earnings information occurred after negative dividend information. Also, a significantly negative impact occurred in equity pricing if positive dividend information was followed negative earnings information.

Kohers and Others (2006)\textsuperscript{56}, compared the risk return profile of 26 emerging and 23 developed stock markets over the period from 1988 to 2003. The results showed that the risk associated with emerging markets as measured by the standard deviation of returns was higher than the risk in developed markets in most periods. The study further concluded that the returns in emerging markets had been higher than those in developed markets for most of the periods examined. That is, the risk averse investors seeking higher returns in emerging markets were compensated for assuming higher risk associated with the markets.

Gregoris and Others (2006)\textsuperscript{57}, examined the CAPM for the Greek stock market using weekly stock returns of 100 companies listed on the Athens Stock Exchange for the period from 1998 to 2002. The securities were grouped into portfolios and found that it was opposite to the basic theory that higher risk (beta) was associated with higher levels of return. The CAPM prediction for the intercept was that it should equal zero and the slope should equal the excess return on the market portfolio. The results of the study refuted the hypothesis and were against the CAPM.

Haddad (2007)\textsuperscript{58}, examined the degree of return volatility persistence and time varying behavior of systematic risk of two Egyptian stock’s portfolios. Daily returns of 18 companies for a period from January 2001 to June 2004 were considered. The empirical results showed that the small stock portfolio exhibited difference in volatility persistence and time variability. And also, that the volatility persistence of each portfolio and its systematic risk were significantly related.

Koo and Olson (2007)\textsuperscript{59}, in their study, revisited the CAPM empirically with data collected from 288 publicly traded companies of NYSE for one year from November 1\textsuperscript{st} 2005 to November 1\textsuperscript{st} 2006. S&P500 index was used as the benchmark for market portfolio. The study concluded that the systematic risk of a portfolio as measured by its market model beta was not a relevant measure of risk, and beta was statistically unreliably related to the return of the portfolio.

“Effect of macro-economic variables on stock market returns for four emerging economies: Brazil, Russia, India and China”, Robert Gay (2008)\textsuperscript{60}, used ARIMA model to describe the relationship between stock market price and

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the two intervening variables of exchange rate and oil price for the period between March 1999 and June 2006. Monthly stock price data were collected from Organisation for Economic Co-operation and Development (OECD) of about 1080 observations. The result showed that there was no significant relationship that existed in the BRIC countries.

Hassan and Others (2008)\(^{61}\), examined the applicability of CAPM in explaining the risk-return relation in Malaysian Stock Market, a sample of 150 stocks in trading and services sector for the period 1995 to 2006 were considered. The results of the empirical test, using linear regression, indicated that the CAPM was statistically significant and it also discovered that time varying beta provided better explanatory power.

Canegrati (2008)\(^{62}\), applied principal econometric techniques to test the CAPM theory in Italian equity markets following Sharp, Lintner version of CAPM, using a 15 year monthly return, from January 1990 until February 2005, within six sectors of stocks listed on the Milan Stock Exchange. The results confirmed the validity of the Sharp-Linter CAPM tests.

Gulnur and Sheeja (2008)\(^{63}\), examined 792 companies listed in the London Stock Exchange from 1980 to 2004, to investigate the effect of a firm’s leverage on stock returns. The results found that leverage had a negative relation with stock return in the overall sample.


Dwi and Others (2009), examined the value relevance of accounting information in explaining the stock return. Considering a sample of all manufacturing companies listed in Indonesian stock market from 2002 to 2006. The regression results of the study found that financial ratios, firm size and cash flows from operating activities altogether affected market adjusted return and abnormal return.

Nikolaos (2009), examined empirically the CAPM model for the UK stock market in a two step regression procedure for 39 stocks on monthly basis for the period from January 1980 to February 1998. It was found that the slope of the security market line was different from the security market line indicated by the CAPM.

Hasanali and Habibolah (2010), examined the risk-return relations in Tehran stock market during 2003-2005. A sample of 74 companies were selected from Iranian companies listed in Tehran Stock Exchange. Also tested the effects of other stock returns’ characteristics such as skewness, kurtosis and unsystematic risk. Skewness had an important effect on returns but kurtosis didn’t have significant relation with returns during the study period. Unsystematic risk was not zero that indicated investors did not hold diversified portfolios. The results indicated that the relationship between returns and beta was non-linear.

3. 2 Beta as a Measure of Risk

The empirical studies relating to the importance of beta and its use in estimating the return behavior is presented below:


Vipul (1998), examined the effect of size of company, industry group and liquidity of the scrip on beta, the systematic risk. The study based on equity shares of 114 companies listed in Bombay Stock Exchange for the period from 1986 to 1993. It was found that the size of the company affected the value of betas. Beta of medium sized companies was the lowest which increased with increases or decreases in the size of the company.

Chawla (2001), made an attempt to examine the stability of beta in the Indian stock market. The objective was pursued with the help of data on monthly returns of 36 stocks from BSE over a period of 4 years from April 1996 to March 2000. The stability of beta was examined by using econometric models of ‘time’ as a variable and adding ‘dummy variable’ in regression model. It was found that betas were unstable over time.

Shah and Moonis (2003), empirically tested the stationarity of beta in the Indian capital market by using daily returns of 50 highly liquid stocks which formed part of BSE and NSE over the time period from May 1996 to March 2000. The results showed that India’s equity market exhibited symptoms of significant time variation in beta.

Manickaraj (2004), examined the stationarity of beta in the Indian context by using the weekly closing equity prices of 38 randomly selected companies listed in Mumbai Stock Exchange for the period from 11th May 1990 to 6th February 1996. The results of the Product Moment Correlation and Rank Order Correlation revealed that the betas were not stationary over time and hence

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could not be used as a measure of future risk for individual securities and small portfolios.

James (2006)\textsuperscript{71}, conducted a study on 35 stocks listed on BSE and NSE during the period from January 1992 to September 2004, to test the beta stationarity in Indian stock market by conducting transition analysis. BSE Sensex and NSE Nifty were used as the predictor variables and found that NSE index was a better estimate of the market than the BSE Sensex. Longer estimation interval showed better stationarity.

Jeevanand and Antony (2007)\textsuperscript{72}, conducted a study on Reliance Industries, listed at BSE, during the period from 1996 to 2006, to test the capability of beta to measure the sensitivity of return of a security to market return. Applying regression equation, they explained that the sensibility of a stock was generally a varying aspect. Beta was constant as it was the slope of a straight line. It could not be used to measure the sensitivity of a stock corresponding to market changes.

Pratap and Others (2007)\textsuperscript{73}, conducted a study of 275 NSE companies that had their Initial Public Offers from 2002 to 2007 as sample, and examined whether beta coefficient of sample firms varied with the length of time. Empirical results found that a moderate window should be used to evaluate the systematic risk of stocks.

Irala (2007)\textsuperscript{74}, examined the stationarity of betas in Indian security markets, using the monthly returns of 660 companies from BSE for a 12 year period from April 1994 to March 2006. Monthly returns were collected from

PROWESS for each security and BSE Sensex for the entire period. The result exhibited that the market explained around 13% variation in security returns and betas for individual securities and smaller sized portfolios were not stable over time.

Das (2008), studied the stability of betas of individual stocks over a period of time, from February 1999 to September 2007, using econometric tests, relating to 39 stocks listed on the NSE Nifty. It was found that 85% of the stocks had a stable beta in one method (regression using time as variable) and 65% for the stocks had a stable beta when using the second method (regression using dummy variable).

Sarma and Sarmah (2008), examined the stability of beta in Indian stock market for the period from December 2001 to November 2006. The data for the study was taken from five stocks that formed part of the BSE Sensex, representing five major sectors. Stability of beta was tested using Chow Test and the result showed that betas were unstable over time.

Rohini Singh (2008), examined 158 stocks of the BSE for the period 1991-2002, using two model of ‘time’ as a variable and ‘a dummy variable’ in regression model. It was found that there was considerable variation in the value of beta and its stationarity and stability depends on the method used. Beta was not stable when the interval period was changed.

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Ray (2010), examined the stability of beta for Indian market for a ten year period from 1999 to 2009. The monthly return data of 30 stocks from BSE100 index were considered in different market phases. The stability of beta was tested using three econometric models, using time as a variable, using dummy variable and Chow Tests. The results of the three models were mixed and inconclusive. Only nine stocks in all the three models reported similar signal of beta stability over different market phases.

Empirical studies conducted outside India regarding the beta as a measure of risk and testing its stability and stationarity over different time periods are enumerated below:

Levy (1971), conducted a study to assess the future riskiness of a security. The weekly returns for 500 common stocks of NYSE over a period of 520 weeks ending 1970, estimated separate ‘betas’ and tested their stationarity by using the product-moment and rank correlation coefficients. The evidence indicated that the betas of individual stocks were unstable. Hence past betas for individual securities were not good estimators of their future risk and the betas of portfolios of ten or more randomly selected stocks were reasonably stable. Hence the past portfolio betas were good estimators of future portfolio variability.

Levitz (1974), analyzed the stability of beta of 800 stocks from S&P list of NYSE during the bear market in America from January 1963 to January 1972. The study used three base periods and one year subsequent period, showed that portfolio betas were very stable whereas individual security betas were highly unstable.

Baesel (1974)\textsuperscript{81}, conducted a study to test the beta stationarity over the period from 1950 to 1967, using monthly price returns. The calculated beta coefficients for 160 securities, listed on NYSE, using Mean Absolute Deviation as a measure of beta stability. The study formed transition matrices for analysis. It was found that the stationarity increased with the increase in period length.

Fabozzi and Francis (1977)\textsuperscript{82}, investigated whether alphas and betas in Single – Index Market Model varied over bull and bear market conditions. Using dummy variable in regression analysis for alpha and beta, three different bull and bear market conditions were used for 72 months from 1966 to 1971 for 700 stocks. The results indicated that neither alpha nor beta in the single index market model was affected by the force of bull and bear market conditions in NYSE.

Fabozzi and Francis (1978)\textsuperscript{83}, conducted a study on 700 stocks on the CRSP Tape from December 1965 to December 1971. The Single Index Market Model found that beta was a random co-efficient. This was the reason that NYSE stocks had less than 50% of the risk explained by market force. The OLS estimate of beta was invariant over time, while the true beta moved randomly.

Roenfeldt and Others (1978)\textsuperscript{84}, estimated beta co-efficients for different sub-periods for a sample of 644 firms for a period from 1963 to 1974 from Compustat Price-Dividend Earnings Tape, NYSE, using transition metrics, betas were ranked and grouped into quintiles. The influence of time duration was important that betas were not reliable for short periods.

Gordon and Norman (1980)<sup>85</sup> examined the beta coefficients for 500 NYSE listed stocks for the period from 1962 to 1975, over two consecutive seven year estimation intervals. Monthly returns were used and the S&P’s 500 index was used as the market index. Using Mean Absolute Deviation as a measure of beta stability, extreme betas were shown to be less stable than interior betas.

Theobald (1981)<sup>86</sup>, investigated the stationarity of beta and its estimation period with a sample of 201 stocks selected from the London Graduate School Stock Price Data Base for the period from 1963 to 1972. Using Ordinary Least Square beta estimate, it showed that stationarity of beta was an increasing function of the time period used for the estimation of beta. Beta was linked to leverage, which changed owing to changes in the stock prices.

Mohamad and Nassir (1994)<sup>87</sup>, studied the stationarity of beta of Kuala Lumpur Stock Exchange (KLSE), taking in the monthly returns of 148 ordinary stocks traded on the KLSE over the period from January 1975 to December 1989. Product Moment Correlation and Rank Order Correlation results showed that the beta of both individual securities and portfolios were quite stationary over time.

Odabasi (2000)<sup>88</sup>, explored the issue of beta stationarity on Istanbul Stock Exchange for the period from 1<sup>st</sup> January 1992 to 31<sup>st</sup> December 1997. The sample included 100 common stocks traded continuously on the ISE. The ISE composite index was used as a proxy for the market index. Weekly and monthly rates of return data were used in the study. The tests indicated that the stationarity of beta was dependent on the estimation interval.

He-ping and Others (2006)\textsuperscript{89}, examined 625 Chinese listed companies that made their Initial Public Offer from the year 1995 to 1999 as samples, to test whether beta coefficients of sample firms varied with time. They found that moderate window estimation was reasonable and short window beta might result overestimation or underestimation and it was unobvious in long window.

Oran and Soytas (2008)\textsuperscript{90}, examined the daily log return of 500 companies listed in Istanbul Stock Exchange, over the period from January 1966 to 2007, to test the relation between individual security return and market return, exhibited a significant relation but not stable.

Hakan and Sevgi (2009)\textsuperscript{91}, analyzed the betas of 225 companies listed in Istanbul stock exchange on the basis of daily, weekly, bi-monthly and monthly returns for the period from January 2000 to December 2008 and showed that the return interval and estimation period had a substantial impact on the estimate of beta.

3. 3 Efficient Market Hypothesis (EMH)

The empirical studies relating to the randomness of the market return or security return leading to weak form market efficiency is enumerated below:

Rao and Mukherjee (1971)\textsuperscript{92}, used spectral analysis to test the random walk model for a period of 16 years from 1955 to 1970 taking weekly average prices of only one company, Indian Aluminium Company, listed in Calcutta Stock Exchange. A large number of spectral estimates were found to fall within

the confidence band and established random walk hypothesis for the company studied.

Ray (1976)\textsuperscript{93}, studied seven daily index series of Indian stock market and conducted run test, serial correlation tests and spectral analysis for the period from January 1996 to July 1972. The study found that the random walk model held only for iron and steel and cement industries.

Kulkarni (1978)\textsuperscript{94} investigated the weekly RBI stock price indices for Bombay, Calcutta, Delhi, Madras and Ahamedbad stock exchanges and monthly indices of six different industries by using spectral method. The study rejected the hypothesis that stock price changes were random.

Barua (1981)\textsuperscript{95} analyzed daily price changes of 20 securities from Bombay Stock Exchange and the data collected from Economic Times Index over the period from July 1977 to June 1979. The results of run test and serial correlation found that no dependency in individual security price changed but the market index exhibited significant serial independence.

Sharma (1983)\textsuperscript{96} analysed weekly returns of 23 actively traded stocks in BSE over the period 1973-78. The integrated moving average form of the random walk model was fitted and was found to be an adequate representation of price changes except for two stocks.

Ramachandran (1986)\textsuperscript{97} tested the weak form efficient market hypothesis using weekend prices of 60 scrips of BSE, covering the period 1976-81. The

study used filter rule test in addition to runs and serial correlation tests, found support for the weak form of efficient market hypothesis.

Rao (1988)\(^{98}\), tested the efficiency level in the Indian capital market, by a sample of week-end prices of 10 blue chip companies in the Bombay Stock Exchange, adjusted for bonus and rights issue, during the period 1982 to 1987. The result supported that Indian capital market was at least weakly efficient.

Yalawar (1988)\(^{99}\), examined the efficient market hypothesis in Indian capital market by a sample of 122 common stocks listed in the BSE during the period from 1963 to 1982. The independence of successive price changes were tested by Spearman rank correlation and run tests. It was found that the BSE was efficient in the weak form as the behavior of stock price was random.

Gupta (1989)\(^{100}\) used weekend closing prices of 39 BSE shares from January 1971 to March 1976, tested the log random walk model and found support for the weak form of efficiency using serial correlation and run tests.

Gupta (1989)\(^{101}\), used data of prices for five share indices from the Bombay Stock Exchange during the period 1979 to 1987, considered both serial correlation and run analysis, and supported the independent assumption of the random walk model.

Obaidullah (1990)\(^{102}\) conducted a study using the price series of 36 actively traded scrips from Bombay Stock Exchange over the period from January 1985 to December 1988. The results of the run test supported the random walk hypothesis in India.

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Chaudhary (1991), studied 93 shares of Bombay Stock Exchange during the period from January 1988 to April 1990 using run test and serial correlation tests. It was observed that 70 first order serial correlation coefficients were significantly different from zero at one per cent level.

Obaidullah (1992), conducted a study to investigate the adjustment of stock prices to announcement of bonus issue by examining the efficiency of the Indian stock market. A sample of 75 bonus issues of companies listed in Indian Stock Exchanges during the period 1987-1989 were considered and found that Indian stock market was efficient in semi-strong form.

Vaidhyanathan and Gali (1994) examined a sample of 10 actively traded shares from BSE for the period from 1980 to 1990, using run tests, serial correlation and filter rule tests for daily data. The evidence from the three tests supported the weak form efficient market hypothesis.

Amanullah and Kamaiah (1995), investigated as to whether Indian stock market was an efficient processor of macro information by applying a causality test. The data used in this study were the monthly stock returns of 53 stocks traded in the BSE, two stock market price indices, namely, Sensex and Natex, and microeconomic variables such as money supply, index of industrial production and general price level for the period from 1987 to 1994. The results supported that the Indian stock market was efficient in a semi-strong form.


and serial correlation coefficient tests indicated non-random nature of the series and, therefore, violation of weak form of efficiency in the BSE.

Pant and Bishnoi (2001)\textsuperscript{108}, analysed the behavior of daily and weekly returns of 5 Indian stock market indices for random walk during the period from April 1996 to June 2001. The indices were tested for their normality, autocorrelation using Dickey Fuller tests and analysed Variance Ratio estimates. The results supported that Indian stock market indices did not follow random walk.

Pandey (2002)\textsuperscript{109} analysed the returns of the BSE Sensex during 1991-2002 by applying simple autocorrelation function and partial auto correlation function and the results indicated that stock returns in India were not entirely random, ie, Indian stock market was not informationally efficient.

James (2006)\textsuperscript{110}, tested the weak form market efficiency in India by selecting 35 listed stocks from BSE and NSE for the period from January 1992 to September 2004. Both serial correlation and run analysis were applied and found that Indian stock market was efficient in weak form.

Gupta and Basu (2007)\textsuperscript{111}, conducted a study to test the weak form efficiency of Indian capital market, considering Sensex and Nifty shares, during the period from 1991 to 2006 and found that there was no evidence of random walk model for the two major equity markets in India, BSE and NSE.

Verma and Rao (2007)\textsuperscript{112}, examined the weak form efficiency of the companies included in the BSE100 index as on March 31, 2001 by applying serial correlation and run test for three years from 1998-99 to 2000-01. They found that for

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the first two years the market was not weak form efficient and rest of the year the market was weak form efficient.

Masood and Others (2007)\textsuperscript{113}, conducted a study to test the weak form efficient market hypothesis. They used time series daily closing prices of 24 firms from the NSE for the period from January 2000 to December 2004. They applied Unit Root test, Auto Correlation Function, Q statistics and K-S tests for analysis. The empirical results showed that across periods and tests stock prices for most of the firms did not support the hypothesis of independence and randomness.

Iqbal and Mallikarjunappa (2007),\textsuperscript{114} examined the stock market reaction to earnings information of 49 companies of BSE, for the September quarter period of 2001. They used the event methodology to test the efficiency hypothesis by using t-tests, run tests and sign tests. Their results showed that market reaction was slow and provided an opportunity to earn abnormal returns. That is, the Indian market was not efficient in the semi-strong form.

Khan (2008)\textsuperscript{115}, examined the behavior of NSE stock prices of 24 companies during the period from January 2000 to December 2004 to test the random walk hypothesis, variant of market efficient theory. The Augmented Dickey-Fuller and Phillips-Perron unit root tests revealed that shocks to share price had a permanent effect on that series.

Deep and Deep (2009)\textsuperscript{116}, criticized fundamental analysis on the ground that all financial data and information of a given security was already reflected in the market price of that security. They used run tests and autocorrelation tests to evaluate the EMH. A sample of 11 companies from BSE was selected from June 30\textsuperscript{th} 2007 to October 27\textsuperscript{th} 2007. The two test results showed that share prices moved randomly.

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\begin{hypertarget}{115}{\textsuperscript{115} A. M. Khan(2008), Testing Weak Form Market Efficiency: Firm Level Analysis at the NSE, Excel Books, New Delhi.}
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Shankar and Dhananjay (2009)\textsuperscript{117}, conducted a study on the pattern of share price behavior of Nifty index to test the random walk model of different variant of market efficiency during the period from April 2002 to March 2007. The results of run test and serial correlation supported the randomness of share price behavior in the Indian market.

Mishra and Others (2009)\textsuperscript{118}, examined the efficient market hypothesis in its weak form in Indian context, considering both BSE and NSE for the period from January 2007 to July 2009. Using unit root test, they found that Indian capital market was inefficient in weak form during the global financial crisis.

Lazar (2009)\textsuperscript{119}, tested the weak form efficiency of Indian capital market during the period from 3\textsuperscript{rd} November 1994 to 30\textsuperscript{th} June 2008. Daily closing prices of S&P CNX Nifty for the period was considered. The results of the Unit Root test and ADF and PP tests concluded that the Indian capital market was weak form efficient.

Mishra (2009)\textsuperscript{120}, examined the informational efficiency of Indian capital market, particularly BSE over a period of 18 years from January 1991 to January 2009, using Random walk and GARCH models. The results evidenced that the market was efficient in weak form.

Iqbal (2010)\textsuperscript{121}, conducted a study to test the semi-strong form of efficient market hypothesis by examining the stock price response to quarterly earnings announcements. As such 157 companies from BSE were selected during the period from June 2000 to June 2004. The results of the non-parametric tests disclosed that the stock price adjustment to quarterly earnings announcement was delayed, hence the semi-strong form of efficient market hypothesis is rejected.


Khan and Ikram (2010), tested the efficiency of the Indian capital market in its semi-strong form of Efficient Market Hypothesis (EMH). The efficiency is tested in relation to the impact of Foreign Institutional Investors (FII’s) on the Indian capital market. Two major stock indices, National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) that represent the Indian capital market have been taken into consideration. Monthly averages of NSE & BSE and Monthly FII’s net investment have taken over the period 1st April 2000 to 30th April 2010. Karl-Pearsons’ product moment correlation coefficient and linear regression equations have been used. The results disclose that the FII’s do have significant impact on Indian capital market, which leads to the conclusion that Indian capital market is semi-strong form efficient.

Empirical studies on market efficiency conducted outside India in different time periods are described below:

Sharma and Robert (1977), tested the applicability of Random walk hypothesis in India, London and U.S.A. The three indices examined were the Bombay Variable Dividend Industrial Share Index (BVDISI), consisting of 603 industrial stocks, the New York Standard and Poor's 425 Common Stock Index (S & P 425), and the London Financial Times-Actuaries 500 Stock Index (London FTA). Data for last Friday in every month was collected for a period of 132 months, from 1963 to 1973. Spectral density estimated for first difference series for each index, confirmed randomness of the series.

Worthington and Helen (2006), examined the weak form market efficiency of twenty seven emerging markets, during the period from 1997 to 2003. Daily market returns were tested for random walks using serial correlation coefficient and run tests, ADF, PP, Unit root tests and Multiple Variance Ratio tests.

All the above test results concluded that the majority of the emerging stock markets were efficient in weak form.

Islam and Others (2007)\textsuperscript{125}, tested the market efficiency of Thailand Stock Market for the period from 1975 to 2001 considering monthly THAI SET 50 Index. Run test and autocorrelation tests were applied and found that this emerging market was inefficient.

Pattanaik (2007)\textsuperscript{126}, examined the Efficient Market Hypothesis in the Muscat Securities Market over the period 1997-2006. In order to test the random walk presence of serial correlations in daily return data of the MSM-30 index, Auto Regressive Conditional Heteroscedasticity(ARCH) and GARCH tests were conducted. Both these tests indicated the rejection of the EMH in the weak form for the MSM-30 index.

Mobarek and Keasey (2008)\textsuperscript{127}, investigated the market efficiency of Dhaka Stock Market for the period from 1988 to 1997. 30 companies were randomly selected from the DSE security list. The results of both parametric and non-parametric tests include K-S tests and run tests, auto correlation, auto regression and ARIMA model showed that the share return series of DSE did not follow random walk and rejected the weak form efficiency hypothesis.

Awad and Daraghma, (2009)\textsuperscript{128}, investigated the efficiency of Palestine Security Exchanges(PSE) at the weak level for 35 stocks listed in the market by using daily observations of the PSE indices for the period from January 1998 to October 2008. The results of the parametric and non-parametric tests revealed that the PSE was inefficient at the weak level.

Alshimmiri and Others (2009)\textsuperscript{129}, studied the impact of information transmission in Kuwait Stock Exchange for the period from 3\textsuperscript{rd} January 1993 to 22\textsuperscript{nd} July 2002, with a total daily observations of 2367 from the KSE Index. The EGARCH results supported that the continuous flow of information affected stock returns all times and influenced the short term volatility of the return. It is weak form inefficient.

Behadur (2009)\textsuperscript{130}, studied the distribution of daily return series for the Nepalese stock market for the period from July 2003 to February 2009. The data set comprised of the daily NEPSE Index with a total number of 1297 observations. Random walk, GARCH, EGARCH models were applied and found that the NEPSE Index returns supported the characteristics of time varying volatility.

Several studies have been brought out by researchers examining the performance of the Indian stock market in explaining the return. Studies on aspects relating to probability distribution of returns, financial variables and security-market return correlations on which the present study is concentrating have been few and far between. Past studies have sidelined a detailed and simultaneous analysis of distributional and financial risk variables versus average rate of return, security-market return versus average rate of return, beta stationarity during longer time periods and tests of efficiency of Indian stock market by using monthly security returns. Hence, the present study is highly relevant and pertinent for the contemporary investors by enabling them to measure various sources of risk that could exert impact on rate of return on equities in India.
