A STUDY OF EFFICIENT MARKET HYPOTHESIS AND ITS IMPACT ON VALUATION MODELS IN INDIAN STOCK MARKET, WITH SPECIFIC REFERENCE TO POST LIBERALIZATION PERIOD

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In partial fulfilment of the requirements
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In
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By

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THESIS COMPLETION CERTIFICATE

This is to certify that the thesis entitled "A Study of Efficient Market Hypothesis and Its Impact on Valuation Models in Indian Stock Market, With Specific Reference to Post Liberalization Period", submitted by Sourav Mazumder in partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy is an original work carried out by him under our joint guidance. It is certified that the work has not been submitted anywhere else for the award of any other Degree or Diploma of this or any other University. We also certify that he complied with the plagiarism guidelines of the University.

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DECLARATION OF AUTHORSHIP

I declare that this research thesis titled "A Study of Efficient Market Hypothesis and Its Impact on Valuation Models in Indian Stock Market, With Specific Reference to Post Liberalization Period", submitted by me in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy in Management by the ICFAI University, Jharkhand, Ranchi is my own work. It contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the University or other Institute of higher learning, except where due acknowledgement has been made in the text. I further state that I complied with the plagiarism guidelines of the University, while preparing the thesis.

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EXECUTIVE SUMMARY

Stock market plays an important role in the capital formation of a country. The stock market is often considered as the primary indicator of a country's economic condition, its strength, and development. It allows the business to raise additional financial capital for investment by selling shares or units of ownership of the company in the public market. Investors also participate in the transaction as a buyer of the shares in the stock market. The liquidity provided by the stock market allows the investors to buy and sell their shares quickly and easily. This is an attractive feature of investing in stocks compared to less liquid assets such as immovable property.The stock market is often called the mirror of the country's economic condition.

From the investment perspective, valuation of stocks plays the most critical role. Valuation of securities is a method of ascertaining the intrinsic value of a stock based on its present financial position and the forecast of various economic and corporate factors. Based on this intrinsic value and comparing the same with the market price, investors normally take the decision to buy, hold and sell the stock. Valuation methods are very important because it creates the link between the market price and firm's financial position.

The efficient market hypothesis suggested by Eugene Fama deals with how information is incorporated into the stock price and considers the speed of impounding of information. It has been subdivided into three categories, weak, semi-strong and strong, each dealing with different types of information. The efficient market hypothesis has strong implications for security analysis.

However, understanding the efficiency of the stock market is very important in context of the testing, valuation models in that particular market, because most valuation models presume the existence of an efficient market. The term 'efficient market' broadly means that the security prices fully reflect all available information. However, most tests of the efficient market hypothesis simply deal with how fast information is incorporated, but do not deal with the fact if the information is correctly incorporated into the price.

The most of the researches that have been carried out in testing the efficient market hypothesis are in the context of a developed markets, where efficiency levels are significantly higher. Therefore, their application in the Indian context is debatable, considering the differential levels of market efficiency. Also in the continuous process of transformation of the Indian stock market, there is a need for the test the efficiency of the Indian stock market in the post-liberalization period and to formulate a customized valuation model applying multivariate regression analysis. This research attempted to find out the relationship between valuation and efficiency of the stock market, which has not been explored or addressed adequately as most researches decoupled the two areas of study as independent and mutually exclusive.

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LIST OF ABBREVIATIONS

AMC	Asset Management Company
AUM	Assets under Management
BSE	Mumbai (Bombay) Stock Exchange
CAGR	Compound Annual Growth Rate
CAPM	Capital Asset Pricing Model
CCI	Controller of Capial Issues
FDI	Foreign Direct Investment
FI	Financial Institution
FII	Foreign Institutional Investor
GDP	Gross Domestic Product
HNI	High Networth Individual
NSE	National Stock Exchange
OTCEI	Over The Counter Exchange of India
ROCE	Return on Capital Employed
ROE	Return on Equity
ROI	Return on Investment
SEBI	Securities and Exchange Board of India

Chapter 1

INTRODUCTION

Chapter 1

Introduction

A Stock Market is a place where the buyers and sellers of stocks/shares transact their deals at a specified price. The stocks include varaities of securities listed on a stock exchange as well as those traded privately. A trade in stock markets means the transfer of shares (stocks and securities) for money from a seller to a buyer. Participants in the stock market ranges from small individual investors to large institutional trader investors and also include institutions like banks, insurance companies, pension funds, hedge funds etc.

Stock market plays an active role in the capital formation of a country. The stock market is considered as the primary indicator of a country's economic condition, its strength, and development. It allows the firms to raise additional capital for investment by selling shares or equivalent units of ownership of the company in the public market. Investors also participate in the transaction as buyers of the shares in the stock market. The liquidity provided by the stock market allows the investors to buy and sell their shares. Thus, investing in stocks offers greater liquidity compared to less liquid assets such as immovable property. Hence, the stock market is also referred as the mirror of the country's economy.

In a stock market, a potential buyer usually fix a price, called as a bid price for a share or stock and a potential seller asks for a specific price for it. Buying and selling in the market mean that both buyer and seller will agreed into the ask price or bid price respectively. When the bid and ask price match, a transaction takes place. Hence valuation of stocks plays the most critical role in everyday transactions in the stock exchange.

Valuation of Securities is a method of ascertaining the intrinsic value of a stock based on its present financial position and on the forecast of various economic and corporate factors. Based on this intrinsic value and comparing the same with the market price, investors normally take the decision to buy, hold or sell the stock. Valuation methods are very important because they create the link between the market price of the stock and firm's fundamental financial position.

Selecting the correct method of valuation is a complex task due to the involvement of multiple factors. Efforts have been made in the past to find the most suitable method of valuation ranging from a simple to a very complex method taking into consideration certain relevant factors at the firm's level. It considers earnings, dividend, risk, cost of fund, future growth rate, etc. In addition to that, many macroeconomic factors such as the price level, inflation, money supply and the interest rate are also considered.

There are three approaches to stock valuation methods. The first methos is the Discounted Cash Flow Valuation which equates the value of a stock to the present value of expected future cash flows to the stockholders. at a given point of time The second, Relative Valuation, estimates the value of a stock by looking at the pricing of comparable stocks in a particular industry relative to a common variable like earnings, cash flows, book value or sales etc. The third is the Option Pricing Model which uses a contingent claim valuation to measure the value of a stock using stock option characteristic.

Absolute valuation models estimate the intrinsic value of a stock by focusing on certain fundamental variables such as growth rate, cash flow, and dividend. Asset-based models such as the dividend discount model, residual income model, and the discounted cash flow model fall in the absolute valuation models category. The dividend discount model is one of the basic models

in this group.It estimates a stock's intrinsic value of the dividends paid by a company to its stockholders.

While discounting cash flow models are enjoying a popularity in the investment community, however, they have been adopted by only a small portion of the security analysts. The majority of security analysts still value common stocks by applying 'Relative Valuation' methods which are the earnings ratio or multiple (Price-Earnings Ratio) to either present normalized earnings or forecasted earnings. While absolute valuation models are widely accepted in the academic fraternity because of the rigor; they are seldom used by practitioners [Bing (1977)]. Researchers value stocks by applying a close surrogate of earnings multiple (usually a price to earnings or simply P/E multiple). Most researchers use historical P/E multiple of stocks in a particular industry or the historical P/E multiple of a stock or panel data across a particular industry or a market proxy (usually an index). Another distinctive approach is to list and discuss a set of factors that are considered to affect P/E multiples, but the weightage and often explicit definition of these factors are left to the researcher's individual perspective. Cross-sectional regression analysis is used to define the weights on a set of determinants of a stock's price over a period of time. At the most generic level, multivariate regression analysis is applied to a set of stocks relating the P/E multiple to more than one variable.

The stock market of India has gone through a series of revolutionary changes since economic liberalization commenced in 1991. The changes were necessary to transform the Indian stock market into a more efficient one. Earlier, the stock market of a developing country like India was characterized by under extensive governmental regulation over its financial system and investment activity. Moreover, it was an underdeveloped capital market, which was influenced by a restriction on capital structure, fewer instruments, restriction on investment opportunities,

poorly developed securities market, uncertainty in the supply of inputs and complex bureaucracy and regulatory norms.

The Indian stock market has witnessed a number of changes as well as unprecedented growth since 1991. Several measures have been initiated by the Government to strengthen the operations of the stock market. Some of such measures can be summarized as follows:

- Liberalization and globalization of Indian economy
- Formation of Securities Exchange Board of India (SEBI)
- Establishment of new stock exchanges
- Introduction of free pricing of public issue
- Advent of Foreign Institutional Investors
- Setting up of advisory panels for primary and secondary markets
- Inspection of affairs of the stock market
- Entry of private sector mutual fund
- Electronic linkage of stock exchanges
- Easy transferability of stocks
- Dematerialization of stocks
- Smaller marketable units of stocks
- Introduction of Derivatives

This research attempted to carry out the tests of valuation models and efficient market hypothesis in the context of the Indian stock market in order to estimate the degree of its strength and maturity in the post-liberalization era.

Understanding the efficiency of the stock market is very important before establishing the valuation models of stocks in that particular market because most valuation models presume that the market is 'efficient'. The term 'efficient market' broadly means that the security prices fully reflect all available information. However, most tests of the efficient market hypothesis deal with how fast information is incorporated in the stock price, but do not consider whether it is correctly incorporated or not.

Efficient Market Hypothesis has strong implications for security analysis. If, the empirical tests find that future returns cannot be predicted from past returns, then trading rules based on an examination of the sequence of historical prices are meaningless. If the semi-strong form of a hypothesis is supported by empirical evidence, then trading rules based on publicly available information has no value. Finally, if the strong form tests show Efficiency, then the usefullness of the security analysis itself would be a question. Thus, an understanding of the efficient market tests would provide guidance in determining what type of analysis is fruitful.

This research carried out tests of all three forms of market efficiency and valuation models in the post-liberalization period. Existing works of literatures have decoupled the two areas of valuation and efficiency as independent and mutually exclusive.This research leads to the possibility that integrating the above areas can help explain the inconsistencies in existing findings and simultaneously throw open new insights in this field of study. It is therefore logical that valuation models hold well in most efficient markets in the West and also play a key role in

investment decision-making. However, our own tests to study the robustness of Whitbeck- Kisor Model and CAPM in India fail to generate conclusive evidence in India. The issue may not be of the validity of the models per se or its customization, but that of market efficiency. Till such market efficiency is enhanced, valuation studies will be a futile exercise in most emerging markets, including India. While how fast information is incorporated in a stock or 'informational efficiency' has been the major area of concern fortesting market efficiency, an issue that has not been addressed adequately is whether the information is correctly incorporated or not,which is referred to as 'market rationality'. Market rationality refers to the ability of investors to logically analyze available market information and identify the potential impact it might have on a stock. This issue assumes more importance in the case of stock markets because of the complexities involved compared to most other product markets and has serious implications for the Indian context.

1.1 Stock Market

The shares or stocks are the units of ownership of a company, traded at a particular place called Stock Exchange. Companies get their stocks listed on a stock exchange. A stock market is the aggregation of buyers and sellers, which can also be called the network of the economic transactions. This does not include the physical transaction of stocks (also called shares) listed on the stock exchange as well as those traded privately. A stock exchange is a place or organization in which stock traders (people and companies) can trade stocks. Other stocks may be traded 'over the counter', that is, through a dealer. At the close of 2016, the size of the world stock market (total market capitalization) was about USD 65.6 trillion. By country, the largest market

was USA (about 36.28%), followed by China (about 10.06%) and the Japan (about 7.92%). India is on the ninth position with a share of 2.59%.

Trade in stock market means the transfer of units of ownership for money from seller to a buyer. This requires the two parties to agree on a price, conferring the ownership interest of a particular company. This price is determined by the demand and supply of the shares in the market, which inturn are determined by factors such as the company's fundamentals and expectation of its future prospects. Participants in the stock market range from small individuals investors to large traders who can be based anywhere in the world, and can include banks, insurance companies or pension funds and hedge funds. A stock exchange trader might handle, buy or sell orders on behalf of themselves and their clients. Some stock and commodity exchanges have physical locations where transactions take place on a trading floor, by the open outcry. Traders on these exchanges enter oral bids and offer simultaneously. The other type of stock exchange is a virtual kind of stock market, which is composed of a network of computers where trades are made electronically by traders. An example of such stock exchange is NASDAQ (National Association of Securities Dealers Automated Quotations).

A potential buyer offers a bid price for a certain stock and a potential seller gives an asking price of the same stock. Bidding and asking initiates the process of buying and selling of stocks in the market. A transaction takes place when the bid and ask prices match. In case of multiple bidders or askers, the transaction is done on a first-come, first-served basis.

A stock exchange serves as a platform (real or virtual) for transfer of securities between buyers and sellers. It offers a market place for successful share trading. The exchange also gives trading updates on the listed securities in real time. Price discovery based on market conditions is also done by the exchange.

Issuance of shares is one of the most popular ways for the companies to raise long-term funds. In this way, companies raise additional financial capital for the expansion of the firms by selling shares of ownership of the company in open markets. On the other hand, the liquidity of exchange helps the investors sell off their holding quickly. This is considered as an important feature of the investment in stocks compared to other less liquid investments such as property and other immovable assets. Stock trading greatly influence the dynamics of the economy of a nation and can help evaluate the social mood acting behind trading decisions. Stock market activity is considered to be the mirror of a country's economic activity. It is also considered as the primary indicator of a country's economic strength and development. Raising share price tends to be accompanied with increased business investments and vice versa. Increasing share prices affects the wealth of the individuals and their consumption. Exchanges, being the counterparty to the buyers and sellers, usually act as the clearing house for each transaction. The smooth functioning of stock market operations facilitates economic growth. The role of the stock market in creating employment is also very important. In this way, the financial system is assumed to contribute to the increased prosperity of a country. In a nutshell, the stock market is the heart of a country's economy through which the savings of individuals are channelized into effective long-term investments. A well developed and vibrant stock market will greatly contribute towards speedy economic growth and development. With the continuous support of the Government, the Indian stock market has now become a well organized, fairly integrated, mature, modernized, demographically well-diversified and one of the best in the world in terms of technology.

1.2 Relation of stock market to modern financial system

In most western economies, the financial systems have witnessed remarkable growth and transformation. Disintermediation has been one of the most significant features of such development. A sizable portion of the funds involved in financing and savings enters the financial markets directly, without being transmitted via conventional bank deposit and lending services. A general willingness of the public in stock market investment (directly or through a mutual fund) has facilitated this process to a large extent.

In the last couple of decades, middle-class households in many countries have started diversifying their investment portfolio by investing in shares. In present-day Sweden, less than 20 percent of the financial wealth of a household goes into deposit accounts and other low-risk assets, compared to 60 percent in the 1970s. The sizable portion of this reshuffling is that financial assets have been invested directly in shares, but a significant part now takes the form of various types of institutional investment, such as hedge funds, mutual funds, insurance investment of premiums, pension funds, etc.

Willingness towards investment ventures with high risk assets has been heightened by new sets of rules for most funds, allowing a greater proportion of shares to bonds. In all developed economies, the same trend has been noticed: moving towards risky securities from the conventional, low-risk assets.

Compared to other asset classes, over the long term, investing made in a well-diversified portfolio of stocks such as an S&P index outperformed other investment vehicles such as gilts, treasury bills and corporate bonds and money market instruments.

1.3 Indian economy and stock market

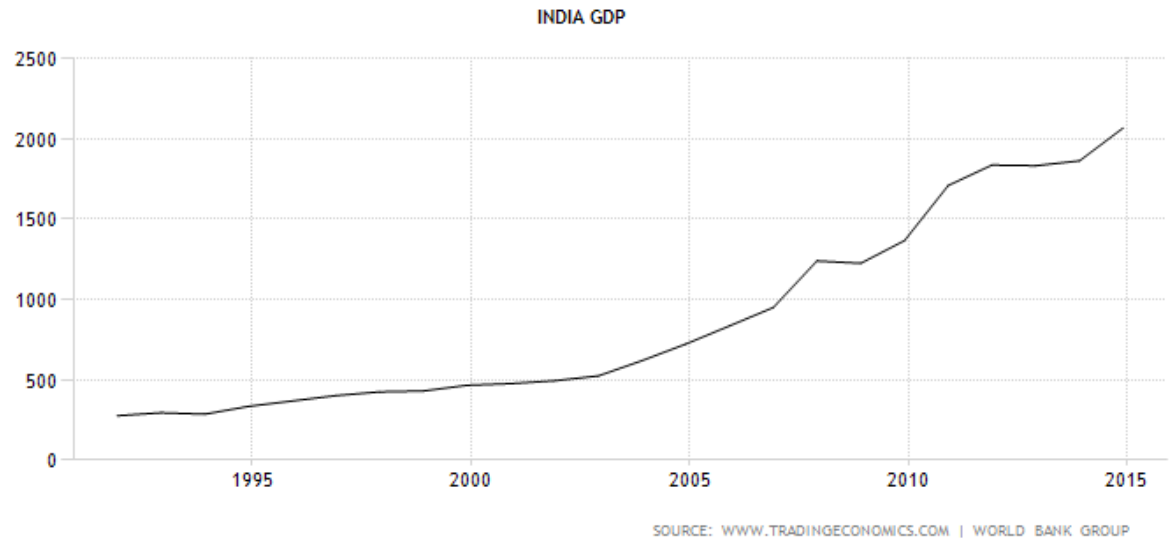
The Economy of India is the seventh largest in the world by nominal GDP and third largest by purchasing power parity. The country is classified as a newly industrialized developing country and one of the G-20 major economies. India is now a member of BRICS, and a developing economy with approximately 7% average growth rate of GDP for the last two decades. Since the last quarter of 2014, India's economy has emerged as the world's fastest-growing economy.

Indian economy has a great prospect for long-term growth. An energetic young population, stable consumption and savings rates, low dependency ratio and an active involvement in international trade have boosted the nation's revenue and propelled the country towards economic growth. India is slated to become the world's third-largest economy by the coming decade. The IMF has already declared India to be a "bright spot" in the global economic domain. India is a member of the United Nations, International Monetary Fund, World Bank, World Trade Organization, Commonwealth of Nations, South Asian Association for Regional Cooperation (SAARC), G20, Asian Infrastructure Investment Bank and the newly formed BRICS bank.

India's tertiary sector is one of the fastest growing in the world. It has had an annual growth rate of above 9% (CAGR) between 2001-2012. India's service sector contributed to more than 55% of the nation's GDP in 2012–2013. India is one of the global leaders in IT services, thanks to her large and well-trained young population with high proficiency in English. The IT, BPO and software services in India accounted for service exports worth $167.0 billion in 2013-2014. IT industry in the country generates millions of jobs every year. India is also one of the biggest

startup hub in the world. Over 3,100 technology startups set up their businesses in 2014–2015 alone. The country is also a big agricultural powerhouse. The farming sector creates great employment opportunities every year, but its share in the GDP has fallen to 17% in 2013–2014. India still stands at second position worldwide in agricultural production. The industry sector contributed about 26% of the nation's GDP in 2013–2014. The country's auto industry produced 21.48 million vehicles annually in 2013–2014, making it one of the largest automobile industries in the world. India had a booming retail market worth $520 billion in 2013 and is now one of the fastest growing e-commerce markets in the world.

Figure 1.1 (GDP growth of India – in USD Billion)

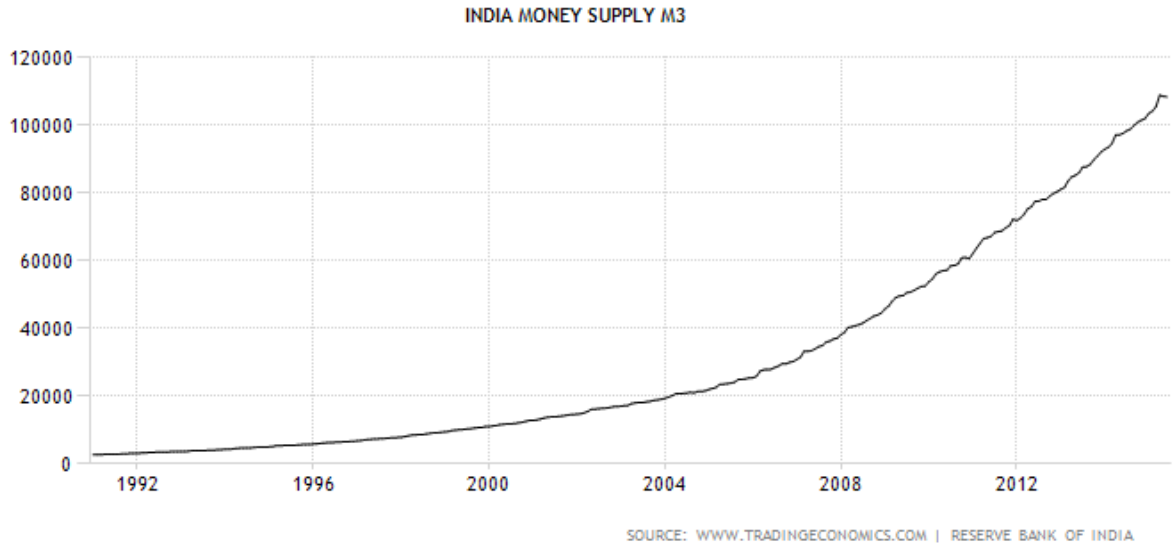


After independence, Indian economic policy was influenced by the colonial experience, which was considered by Indian leaders as exploitative. Exposures to social democracy of the British, as well as the planned economy of the Soviet Union made Indian leaders adopt a guarded approach towards economic policies. Domestic policy was more inclined towards protectionism, with a strong emphasis on industrialization, import substitution, economic interventionism, a

large government-owned public sector, business regulation and central planning. However, the trade and foreign investment policies were relatively liberal.

In 1991, Prime Minister Sri Narasimha Rao along with his finance minister Dr. Manmohan Singh initiated the process of economic liberalization. The reforms scrapped the years old license raj, initiated the process of reduced tariffs and interest rates, ended many public monopolies and encouraged foreign direct investments. Thus India moved towards a free-market economy, with state control getting reduced substantially as financial liberalization propelled the nation's economy towards a new era of growth and prosperity. India is now often seen by the economists as a blooming economic superpower and is believed to play a major role in the field of global economy in the 21st century.

Figure 1.2 (Money supply growth of India INR - Billion)



1.4 Role of Foreign Institutional Investors (FII) in Indian Stock Market:

Capital is the most important factor that drives the growth of the country. India is a vast country with large population, where domestic capital is not sufficient to sustain the economic growth at

the desired level. Hence, for a developing country like India, foreign funds are considered very important and productive. Foreign capital inflows into the country comes in two forms, Foreign Direct Investment or FDI, and Foreign Institutional Investment or FII. FDI is considered as a more stable form of capital with an investment horizon of a longer duration than FII, but FII inflows and outflows which are short-term investments in nature directly impact the stock market. A major development of our country has been the liberalization of the financial sector, particularly the capital market. Since 14 September 1992, FIIs were allowed to invest in securities, subject to certain restrictions, and traded in the primary and secondary markets, including debentures, warrants and shares issued by companies which are listed in the stock market and in various schemes floated by domestic mutual funds.

India is the third largest investor base with over 20 million shareholders in the world in 2015 after USA and Japan. More than 9000 companies are listed in the Indian stock market which is serviced by over 7500 brokers. The Indian capital market is considered to be a very big market in terms of volume of trading, level of development and growth potential.

The role of FII is to provide short-term investment by foreign institutions in the financial markets of other countries. These institutions are generally insurance companies, mutual fund houses, and pension funds. Through the avenues of FII investments, a significant amount of capital is flowing from the developed countries to developing economies in the form of short term investments. Better fundamentals of the firms coupled with a fast-growing economy have made India an attractive destination for FIIs. Investments made by FIIs are often called 'hot money' as they can be pumped out at any point of time, still they have emerged as most important players in the Indian capital market. Liquidity, as well as the volatility of the Indian capital market, is highly influenced by the FII's activity. They also play an important role in ascertaining the movement

of stock prices. FIIs contribute to the foreign exchange inflow as the funds from other international fund houses and FDIs are inadequate. This leads to better 'balance of payments' position in the country and provides soundness of the economy. It also provides better pricing of Indian currency against other foreign currencies. This enables access to cheap credit, which in turn lowers cost of capital to the domestic firms. The FII investments act as a supplement to domestic savings and investments. They help the Indian capital market to hold the reforms of the financial sector and also lead to better pricing of stocks in the market. They increase the depth and breadth of the market and also play a major role in enlarging the securities business. Their primary policy is based on the theory of focusing on the fundamentals which facilitates efficient pricing of shares. Hence we can conclude that Foreign Institutional Investments play a key role in the Indian capital market not only from the aspect of volatility and liquidity but also from better pricing and transparency. Several types of research have been conducted by researchers and their results are quite similar in nature, i.e. FII investments greatly affect the movement of the Index across different time periods. However, FII investments in India depend upon several key determinants. They are:

- Country risk or political risk
- Inflation
- Interest rate
- Financial performance of domestic firms
- Equity returns
- Economic growth of India (GDP)

(Karan Walia, 2012) in their paper 'Impact of Foreign Institutional Investment on Stock Market' concluded that FII investment influenced the Sensex movement to a great extent during the time

frame 2000-2001 to 2011-2012. It was evident that a positive inflow of FIIs resulted with a upward movement of Sensex and there was a fall in Sensex in case of a fund withdrawal. The Pearson correlation coefficient (r = 0.7464) indicates that there exists a positive relationship between FII investment and the movement of the Sensex.

(Shrivastav, 2013) concluded that during 2001-2010, there was a moderate degree of positive correlation between FII investment and stock prices. However, interestingly, consumer goods and consumer durable sectors were found to be less dependable on FII's investment and BSE IT index to have a negative correlation with FII's investment.

(Mayank, 2014) in the article 'Impact of FII on Stock Market in India' concluded that during 1993-2013, there was a high correlation between FII flow and rise of the index of Indian stock market in a longer span but a very less impact in the short span.

(Loomba, 2012) in the article 'Do FIIs Impact Volatility of Indian Stock Market?' showed that FIIs were stronger forces driving the Indian stock market during 2001-2011. He also found that FIIs were the net sellers in market crashes of the BSE Sensex during the same period.

1.5 Role of stock exchanges

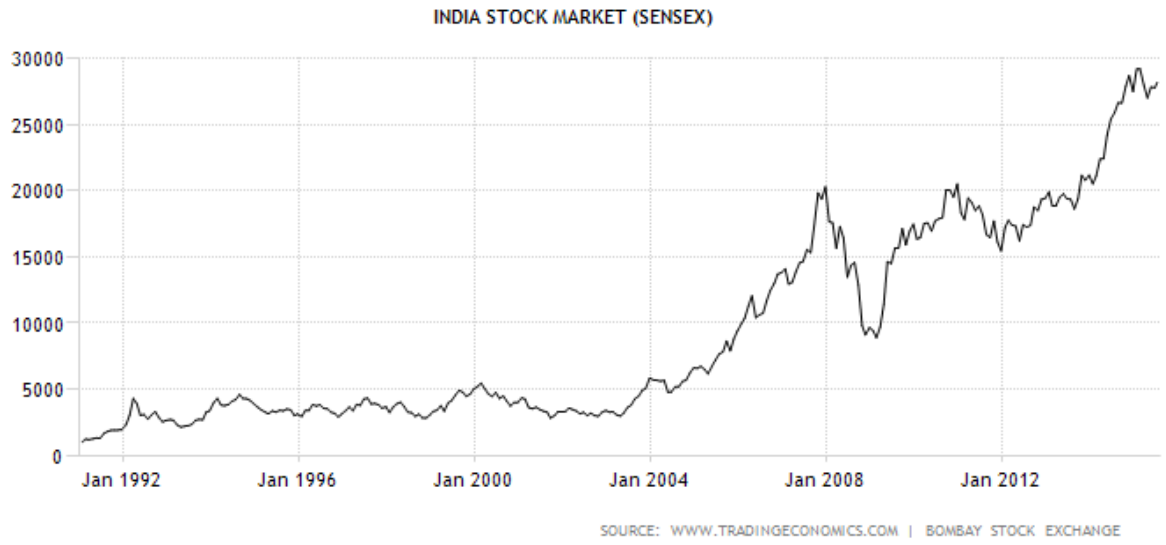
1.5.1 Bombay Stock Exchange (BSE)

The Bombay Stock Exchange Ltd (BSE) is Asia's first and fastest stock exchange. It was founded in the year 1875. It is one of India's leading exchanges, clocking a median response time of six microseconds. Over the past 140 years, BSE has contributed immensely towards the growth of the Indian corporate sector. It has provided a consistent platform for capital generation

and a busy market for equity trading and trading in a mutual fund, derivative and debt instruments. In terms of listed companies, BSE ranks as the biggest exchange in the world with more than 5500 companies listed in its database. The total market capitalization of companies listed on BSE is about USD 1.68 trillion as of March 2015. It is also one of the biggest exchanges for Index options trading (fifth largest in March 2015). BSE, also offers a range of other services to capital market participants such as market data services, settlement, clearing, risk management and education. The processes and systems of BSE are designed to expand the Indian capital market, protect market integrity, encourage innovations and stimulate market competition. BSE is the second exchange in the world to obtain an ISO 9001:2000 certification. BSE, also offers depository services through Central Depository Services Ltd. (CDSL). BSE's equity index – the S&P BSE SENSEX – is like the barometer of Indian stock markets. It is the country's most extensively tracked stock market benchmark index. BSE Limited has been considered synonymous with the stock market in India and its benchmark index S&P BSE SENSEX reflects the health of the Indian economy.

The S&P BSE SENSEX (also called BSE 30), is a market-value-weighted index of 30 well-established and blue chip companies listed on the Bombay Stock Exchange. The companies included in the index are financially very sound and are the most actively trading entities in the market. The companies of SENSEX represent various industrial sectors of the Indian economy. The base value of the S&P BSE SENSEX is taken as 100 as on April 01, 1979 and the base year as 1978-1979. DOLLEX-30, a dollar-linked version of the S&P BSE SENSEX, was launched by BSE in 2001.

Fig 1.3 (Growth of Sensex)



S&P BSE 100 is a broad-based index comprising of the 100 listed stocks representing various industries.This index has 1983-1984 as the base year and was launched on 03 January1989.

1.5.2 National Stock Exchange (NSE)

The National Stock Exchange (NSE) is the leading stock exchange in India covering different geographical locations across the country. NSE provides a modern, fully automated screen-based trading system with a PAN India presence. The Exchange thus brings about greater transparency and speed in trading by making the trading process more efficient, safe and well-integrated. The facilities set up by the exchange serve as a model for the securities industry in terms of systems, procedures and practice. The exchange reformed the Indian securities market in terms of trading output, trading practices and microstructure. The market utilizes advanced information technology, and makes provisions for a highly transparent and efficient trading, clearing and

settlement procedure. It has introduced several innovations in trading such as demutualization of stock exchange operations, screen-based trading, dematerialization and electronic transfer of securities, compression of settlement cycles, lending and borrowing of securities, developing better risk management system, formation of clearing corporations to assume counterparty risks, marketing of derivative and debt instruments and successful use of modern technology.

The National Stock Exchange of India Limited has its origin in the report of the High Powered Study Group on 'Establishment of New Stock Exchanges'. It came up with a decision regarding the formation of National Stock Exchange by financial bodies in order to provide access to investors spreading across every corner of the country. Based on the suggestions and recommendations, NSE was formed by leading financial entities in 1992 as a taxpaying company, different from other stock exchanges in India in terms of its operational efficiency.

The National Stock Exchange (NSE) operates nation wide and offers trading in capital market, currency derivative segments and derivatives market, including equities, equities-based derivatives, currency derivatives, equity based ETFs, Gold ETFs and retail government's securities. Today, the NSE network operates in more than 1,500 locations in the country and catering more than 2, 30,000 investor centers.

NSE has a market capitalization of more than US$ 1.41 trillion, making it the world's 12^{th} largest stock exchange as on March 2016. NSE's flagship index is the CNX Nifty (NIFTY 50) which is used extensively by investors in India and abroad as a benchmark of the Indian capital market. The CNX Nifty is a stock index comprising 50 of the biggest and most liquid stocks listed on the NSE. The NIFTY 50 covers 13 sectors of the Indian economy. It is used for fund portfolios, benchmarking index funds and index-based derivatives.

Chapter 2

LITERATURE REVIEW

Chapter 2

2.0 Literature Review

2.1 Valuation models

Valuation Model is a method that uses a series of historical values or forecasts to determine the fundamental or intrinsic value of a financial asset. The intrinsic value is an estimate of the value of the stock, as it should be, based on its fundamentals. The market value, though may be different in the short-term, is an indication in which direction it is likely to move in the medium to long-term. It is important because valuations are the fundamental sources of excess returns for investors and fund managers. Valuation of stocks is done using various types of models based on the fundamentals of a company. The first generation models include 'absolute value' models which attempt to derive the present value of stocks using expected future benefits. According to these models, the value of a stock equates to the present value of future benefits that a stockholder expects to receive in future. These kinds of models take two general forms: single-period models (Gordon, 1962) or multi-period models such as discounted cash flow models (Modigliani, 1961). These models are based on financial forecasts rather than historical observations.

However, there is a contentious debate about the financial benefits that should be discounted. Some authors consider earnings, some dividends, and others cash flow from operations. It turns out that these methods, though independent, are largely equivalent. One of the major limitations of multi-period models is that future benefits have to be forecasted into the indefinite future

(Baker & Halsem, 1974). As models became more complex, a point of diminishing returns is reached. To overcome the over-dependence on forecasts, researchers follow the constant growth model, where it is assumed that the firm will maintain a stable dividend keeping its retention rate constant (Bierman, Downes, & Hass, 1972). The more advanced 'relative value' models determine the value of a stock based on the observations of market prices of a similar class of assets (Whitbeck & Kisor, 1963). They use certain determinants of stock prices and compare them with a market or industry index using multivariate techniques to arrive at generic models. In recent times, complex 'option pricing' models are used for derivatives in complex real-time situations where the valuation is derived from an underlying asset. The most common 'option pricing' model is the Black and Scholes (Black, Fischer, & Scholes, 1974).

There are broadly three approaches to valuation. The first, the Discounted Cash Flow (DCF) valuation, measures an asset's present value, or its investment potential, by estimating and discounting future cash yields related to the asset by an appropriate rate.The second, relative valuation, measures the value of an asset by comparing its price to the market price of other similar assets, with respect to a common variable such as cash flows, book value, earnings or sales. The third, contingent claim valuation, applies option pricing models and factors to estimate the value of an asset that shares option traits.

2.1.1 Absolute Valuation

Absolute valuation models try to derive the intrinsic value of a stock by looking at certain fundamentals such as growth rate, cash flow, dividends or a variable limited to a certain company. It does not take into account the fundamentals of other companies/firms in the same

industry. Valuation models that belong to this category include the discounted cash flow model, dividend discount model, residual income model and similar asset-based models (Gordon, 1962, Walter, 1963). The dividend discount model is one of the basic absolute valuation models. The dividend model calculates the intrinsic value of a stock based on the series of dividends a company pays to its stockholders. The justification for using dividends to value a stock is that dividends represent the actual cash flows going to a stockholder. Thus valuing the present value of these cash flows in the form of dividend should indicate a value of how much the stock should worth. However, it is not enough for the company to just pay a dividend; the dividend should also be stable and predictable. What if the company does not pay a dividend, or if its dividend pattern is irregular?

Further refinements led to absolute valuation model using a firm's discounted future cash flows to value the stock. The advantage of this approach is that it can be used for a wide variety of firms that do not pay dividends, and even for companies that do pay dividends. Absolute valuation models also differ in terms of their time frame under study. In a single period valuation, a valuer needs to forecast the expected dividend and the value of the stock at the end of the year. In a multi-period model, the intrinsic value depends on the present value of the infinite streams of dividends the stockholders expect to receive. At this point, a question may arise as to why earnings as an important parameter are don't factored in these models. Technically, earnings can be used for any of the two purposes: they can be paid out to stockholders as dividends, or they can be ploughed back for future reinvestments. If they are reinvested, they are likely to increase future earnings and hence future dividends.

2.1.2 Relative Valuation

While absolute value models are widely accepted in the academic fraternity because of their rigour, they are seldom used by practitioners **(**Bing, 1971**)**. Researchers value stocks by applying a close surrogate of earnings multiple (usually price to earnings, or simply P/E multiple). The approaches to the establishment of the P/E multiple covers a wide range. Most researchers use historical P/E multiple of stocks or panel data across a particular industry or a market proxy (usually an index). Another distinctive approach is to list and discuss a set of factors that are considered to affect P/E multiples, but leaving the weighing and often definition of these factors to the researchers' individual perspectives (Graham, Dodd, and Cottle, 1962). Cross-sectional regression analysis is used to define the weights on a set of hypothesized determinants of a stock's price over a period of time. At the most generic level, multivariate regression analysis is applied to a set of stocks in order to relate the P/E multiple to more than one variable.

One of the earliest empirical studies to use this approach was conducted by Whitbeck Kisor in 1963. According to this model, the P/E multiple of a stock was related to its earnings growth rate, payout policy, and risk. Accordingly, the relationship was defined as: P/E multiple = 8.2 + 1.5 (projected earnings growth rate) + 6.7 (dividend payout) – 0.20 (variation in earnings). This equation represents a relationship , the simultaneous impact of the three independent variables on the dependent variable. The coefficients represent the weight that a market places on each independent variable. The signs signifies the direction of the impact of the variables on the P/E multiple. It is very important to note that that the weights and signs are dynamic and are likely to vary across time as well as across contexts. The overall explanatory power of the model is quite high, given that fact that the signs are consistent with existing theory and common financial

acumen. An equation, such as this, can be used to derive the theoretical P/E multiple for any stock by substituting the values of the independent variable forecasts. Such findings can be used for investment decisions to go long or short on a particular stock. There are indications that interests in such models has increased of late. Every conceivable variable and combination has been tried (Bower & Bower, 1969)**,** (Gruber, 1971)**,** (Malkiel & John, 1970) for predicting stock outcomes with varying degrees of success.

2.1.3 Option Valuation

An Option is a financial asset which gives the buyer the right, not the obligation, to buy or sell an underlying asset at a specified strike price on or before a specified date. The seller has the obligation to fulfill the transaction, i.e. to act as a counterpart to the buyer and sell or buy if the buyer exercises the option. In essence, the buyer of an option can hold on to the right untill maturity or sell it before the expiry date, and the price is paid/received for a purchasing/ selling option. This transaction depends on its value, underpinning the valuation of the option.

The valuation of equity share is considered as the residual claim to the equity holders, i.e. they claim to all cash flows left over after other financial claim holders (debt, preferred stock etc.) are satisfied. If a firm winds up its business, equity investors get whatever is left as a residual claim in the company after deducting all outstanding dues, debts and other financial liabilities. Equity investors in publicly listed companies are protected by the principle of limited liability. If the company has outstanding debt obligations, equity investors won't lose more than their invested sum. Therefore, the payoff to equity investors is identical with the pay-off available to the buyer of a call option. Equity of a firm thus can be considered as a call option of a firm, where

exercising the option requires the firm to be liquidated and the face value of the debt to be paid off.

In discounted cash flow valuation, the objective is to find the value of an asset, considering its cash flow, growth of earnings and risk characteristics. However, in relative valuation, the objective is to value an asset based on how similar assets are currently valued in the market. The basic stock valuation model is the value of the future benefits associated with the stock, discounted by an appropriate rate. The discount rate is proportional to the risk arising from the variability of such benefits associated with the asset.

Finding the correct method of valuation is a complex task due to the involvement of multiple factors. Sometimes, wrong assumptions made relating to future variables turned the whole valuation process into a dead end. Efforts have been made to find the most suitable method of valuation, ranging from a simple to a very complex method, and taking into consideration relevant factors at the firm's level, such as earnings, dividend, risk, cost of funding, future growth rate, etc. In addition these, several macroeconomic factors like price level, money supply, inflation or interest rate are also considered.

In the complex market scenario, it is very difficult to assume the future cash flow as well as the discount rate. Moreover, only the fundamental analysis based on past financial statements (profit and loss, balance sheet etc.) was not sufficient. A correct valuation model should consider the past performance as well as a future prospect under various economic conditions. This makes the whole process of valuation very complex in nature. In contrast, the valuation methods based on relative valuation are realistic in approach, easy to calculate, and can be comparable among companies and different industries. Hence it is the most widely used tool by analysts.

In simple terms, price-earnings (P/E) ratio or multiple is calculated by dividing the market price of a stock of a particular company by its diluted earnings per share. It shows how much investors are willing to pay per unit of earnings. That is why it is also referred to as a 'multiple'. However, it carries a lot of significance. If the price-earnings (P/E) multiple can be justified for a particular firm, the valuation becomes easy and can be compared among firms within the same industry as well as between industries, and also for the market as a whole.

The P/E ratio has been considered as a function of two factors – the market price of the traded stock and its earnings per share. The P/E ratio, being more important, carries a lot of significance and hence cannot be considered as a function of only two factors. However, this definition can be further extended to establish a link between the absolute and relative method of stock valuation. It is considered as a valuation ratio and a function of a number of fundamental factors. The model of valuation will be more complex in nature and the model becomes a multifactor model.

Approaches for the justification of the P/E ratio cover a vast range. A large number of factors such as earnings, past earnings growth rate, dividend policy, risk, time value of money, future earnings growth prospect, etc. are used to measure and weigh these together in order to estimate the P/E ratio. The relationship that exists in the market at any point of time between the price of a stock or price-earnings ratio and a set of specified variables can be estimated using regression analysis. In other words, if the factors responsible for the P/E ratio can be identified, a link can be established between absolute valuation and relative valuation method, and the whole process of valuation becomes transparent.

In discounted cash flow valuation method, the objective is to find the intrinsic value of an asset, given its fundamental features like cash flow, growth and other risk characteristics. However, in

the relative valuation model, the objective is to value an asset based on how similar kinds of assets are currently priced in the market. According to the description, there are three steps in relative valuation. The first step is finding comparable assets similar in nature which are already priced in the market. Usually, analysts use other companies in the same sector or industry as comparables, i.e. comparing a banking firm with other banking firms or comparing a cement producing company to other cement producing companies etc.

The second step is scaling the market prices of a stock to a common variable which can generate standardized multiples that are comparable. In the context of stocks, such equalization usually requires converting the market value of common stocks into multiples of earnings, book value or revenue. The third and last step is the process of adjustment of differences across assets when comparing their comparable standardized value. In case of common stocks, differences in pricing of stocks can be attributed to the stock specific fundamentals. For example, companies with higher earnings growth should trade at higher multiples than lower earnings growth companies in the same industry.

Most equity research reports are based on multiples, a few of which are a price-earnings ratio, Enterprise Value to Earnings before Interest Tax Depreciation and Amortization (EBITDA) ratios, and Price to Sales ratio. A study of more than 500 equity research reports in 2001 relative valuations out-numbered discounted valuation by almost 10 to 1. This out numbering was derived from the researches from different investment banks in the United States, Europe, and Asia. Though the equity research reports based on the cash flow tables, values were estimated and recommendations suggested by looking at comparable firms and using multiples. Thus to decide whether a stock is undervalued or overvalued, equity analysts usually take the decision based on relative valuation.

Discounted cash flow techniques are more commonly used in acquisition and corporate finance. Most of the acquisitions are backed by discounted cash flow valuation; moreover the value paid in the acquisition is often determined using a multiple. Therefore, in acquisition too, relative valuations are used with discounted cash flow valuations methods. In many cases the terminal values are calculated using multiples.

Most investment rules of thumb are based on multiples. For instance, many investors consider stock of the companies that are trading at low P/E ratio than the average industry P/E ratio or lower than the book value as cheap and take buy decision based on this theory.

Use of multiples and comparable can be done more quickly and less time- and resource-intensive than the discounted cash flow valuation approach. Discounted cash flow valuation requires substantially more information and assumption than relative valuation . For the analyst having time constraints and limited access to information, relative valuation offers a less time-intensive alternative.

In many cases, analysts often used valuation models to sell stocks to investors and portfolio managers. Under such circumstances, it is easier to explain a price-earnings valuation model than a discounted cash flow valuation. Discounted cash flow valuations can be difficult to explain to clients, which considers more variables especially when working under a time constraint. Relative valuations, in contrast, fit into short sales contracts.

Analysts are often asked to explain and defend their valuation assumptions. Detailed lists of assumptions in discounted cash flow valuations make defending the same a challenging task for analysts. Relative valuations are comparatively easier to defend, as the value used as a multiple is derived from the market value of stocks in the same industry. Relative valueation mirrors the

ongoing market trend as it tries to calculate the relative and not intrinsic value. Thus when all Information Technology stocks register a higher bid in a market, relative valuation will yield higher values for these stocks than discounted cash flow valuations – values that are nearer to market prices than discounted cash flow valuations of all stocks.

Relative valuation is not without its weaknesses. Since it readily pulls together a multiple and a number of similar firms for comparison, some inconsistencies in estimates of value might creep in, particularly since key variables such as growth, risk or cash flow potential are not taken into account. Second, since multiples mirror the market trend, this also means that the relative valuation of an asset can yield values that are either too high or too low. The former happens when the market is overvalued similar firms and the latter when the market undervaluing them. Third, a chance of biased valuation also cannot be ruled out. Measurement of the value of a stock might lack transparency, thereby increasing the risk of manipulation. An analyst who is heavily biased and free to choose the comparable firms can make sure that almost any value can be justified. One of the earliest attempts to use multiple regression to explain price-earnings ratios was the (Whitbeck & Kisor, 1963). In the article 'A New Tool in Investment Decision-Making' Volkert S. Whitbeck and ManownKisor, Jr. considered two stocks – International Business Machines (IBM) and General Motors (GM) – and tried to find out the reason why the common stock of IBM was trading at a multiple of 35 whereas that of GM was trading at less than 18. They found that there exists a positive relationship between the price- earning multiple and the historical growth rate of earnings per share and found that the growth rate of IBM in net income per share, as indicated by the slope of its historical earnings path, has been considerably more rapid than that of GM. They also found that IBM was showing an annual average projected growth rate of 16.1% while that of GM indicates an average rate of only 5.3% per annum over

the 15-year period. Moreover, considering the standard deviations in percentage terms, for IBM, over the same 15 years, standard deviations of earnings about trend were 22.1%, for less stable GM 29.9%. Later, they extended the model and found that the price-earnings ratio is an estimate of the projected earnings, growth rate, dividend payout and the variation in earnings in terms of standard deviation.

P/E multiple = 8.2 + 1.5 (projected earnings growth rate) + 6.7 (dividend payout) – 0.20 (variation in earnings).

The above formula reveals that price-earnings multiple prices the earnings growth rate, dividend payout ratio and the stability (less variability) of the earnings. The negative sign before the coefficient of the standard deviation of earnings clearly signifies that more the stability (less variability), more the multiple of the stock.

The Whitbeck-Kisor model has been considered for the following reasons:

- The model was framed in the USA market, which was considered to be an efficient capital market
- It considered 135 stocks for a period of 15 years
- The model was tested and verified
- The model considered the basic formula of the price-earnings multiple, i.e. dividend payout, the growth rate of earnings and variability of earnings as *r* (required rate of return or the risk associated with the return)

4.1 Price-earnings ratio

$$\frac{P_0}{E_0} = \frac{D_0/E_0(1+g)}{r-g} = \frac{(\text{dividend payout ratio})(1+g)}{r-g}$$

Where,

P_0 = today's price
E_0 = current earnings per share
D_0 = current dividend per share
g = expected growth rate
r = required rate of return

Several works of literatures have been reviewed on the valuation models of stocks that are traded in the market. However, the following articles are found to be relevant in the context of stock valuation.

(Balbhimrao & Kanahalli, 2012) attempted to identify undervalued and overvalued scripts, applying Whitbeck- Kisor model during 2006-2011 in the Indian context, but the model was not tested in the Indian stock market as a whole. They tried to test the P/E model of investing in Indian stock market. They, however did not find any concrete evidence.

(Bower & Bower, 1969) initially worked on the basic hypothesis that differences among stocks in price to normal earnings ratios depend on differences in expectations about earnings growth rate and payout rate, and on the differences in risk class or discount rate. However, they added three more factors in the existing model. The first was that the discount rate for the stock will depend on its marketability, the conformity of its price movements with general market movements, its price variability, and certain other characteristics such as management resiliency and vulnerability to government action, which can be described as firm effects. The second is that expectations about the horizon of the non-normal growth period (n) and normal-earnings

growth rate vary from one period to the next, but are the same for all stocks in a given period. The third and the last hypothesis is that the relationships can be approximated by an equation which is linear in the logarithmic form.

(Estep, 1985) formulated the T Model, a new stock valuation model for estimating investor's expected return. The T Model expressed total return in terms of a company's growth rate, its return on equity and its price-book value ratio. The model showed that the expected return is independent of a company's dividend policy or its current yield. The model implied that a low price-book ratio is usually desirable because lowering price-book ratio increases the expected return if the company's ROE (Return on Equity) exceeds its growth rate. The price-book ratio by itself, however, is an incomplete estimator of return. Variations in growth rate (g), ROE and industry averages must also be considered. Its effect will depend to a great extent on a firm's price-book value ratio. Preliminary tests of the T Model suggested that it can successfully rank stock portfolios according to their future relative performance and may be more successful than the standard dividend discount model in this regard. It is also easier to use and intuitively more appealing than the dividend discount model. Furthermore, the model also offers useful insights into the relations between growth, price-book ratio, expected return and passes practical tests for actual return forecasting.

In the article, 'Valuation of Quality-Growth Stocks', (Good, 1972) examined the 'two-tier' stock market that existed in the stock market prior to 1971. There has been a bull market in 'High-Quality Superior Growth' (HQSG) stocks and for the remainder of the market, there was a virtual standoff as many cross-currents tended to cancel each other out. The useful starting point of the research was a classification of stocks of investment characteristics which referred to certain attributes, such as financial strength, competitive position, anticipate growth rate etc.

which have a bearing on stock valuation irrespective of industry category. The HQSG companies were found to be well-situated to progress in the face of major problems expected to characterize the years ahead. They were well-adapted to live with the difficulties associated with inflation, including a possible extension of wage-price controls beyond the present expiration date. They measured up to a very high standard of competitive strength. This factor has become increasingly important as a result of the lessening of windfall growth opportunities and increasing competitive pressures evident in most industries. Considering everything, participation in promising product areas offered relatively well-defined prospects for superior earnings on growth over the long term. In contrast, major uncertainties cloud the future of many of the traditional 'blue chip' companies.

(Hamburger & Kochin, 1972) tried to find out the relationship between changes in the quantity of money and the movement in equity prices. Changes in monetary growth have a number of different effects in the market. There were the widely acknowledged influences flowing through long-term bond rates and corporate earnings. Evidence also suggested that there was a direct portfolio effect, although it was difficult to completely disentangle this effect from the one operating through corporate earnings expectations. Finally, the result provided confirmation for the theory of the existence of a risk premium on the general level of stock market prices related to the changing variability of the economy. The work began the measurement of determinants of this premium, one of which appeared to be instability in the growth of money.

In a pioneering research, (Basu, 1977) attempted to determine empirically the relationship between investment performances of equity securities and their P/E ratios. While the efficient market hypothesis deny the possibility of earning excess returns, the price-ratio hypothesis asserted that P/E ratios, due to exaggerated investor expectations, may be indicators of future

investment performance. During the period of April 1957 to March 1971, low P/E ratio portfolios seemed to have on average earned higher absolute and risk-adjusted rate of return than high P/E securities. It was found to be generally true when bias on performance measures resulting from the effect of risk was taken into account. These results suggested a violation in the joint hypothesis that (i) the asset pricing models employed in the paper had descriptive validity, and (ii) securities price behavior is consistent with the efficient market hypothesis. If (i) above was true, asset pricing models employed in the study had descriptive validity, and (ii) securities price behavior was consistent with the efficient market hypothesis. The results reported in the study were consistent with the view that P/E ratio information was not 'fully reflected' in security prices in as rapid a manner as postulated by the semi-strong form of efficient market hypothesis. Instead, it was found that disequilibria persisted in capital market during the period studied. Securities trading at different multiples of earnings, on average, seemed to have been inappropriately priced vis-à-vis one another, and opportunities of earning 'abnormal returns' were afforded to investors. Tax-exempt and tax-paying investors who entered the securities market with the aim of rebalancing their portfolios annually could have taken advantage of the market disequilibria by acquiring low P/E stocks. Finally, Basu concluded that behavior of security prices over the period of study was not completely described by the efficient market hypothesis. Low P/E portfolios did earn superior returns on the risk-adjusted basis. The proposition of the price-ratio hypothesis on the relationship+ between investment performance of equity securities and their P/E ratios seemed to be valid. Contrary to the belief that publicly available information is instantaneously impounded in security prices, there seemed to be lags and frictions in the adjustment process. As a result, publicly available P/E ratios seemed to

process ‘information content’ and might warrant an investor’s attention at the time of portfolio formation or revision.

(Foster, 1970) in his paper expressed the price-earnings ratio as a concept consistent with the principles of present value theory. It is directly derived from the present valuet heory and assumes specific combinations of values for earnings growth, growth duration, and discount rates.

(Robicheck & Bogue, 1971) worked on the various determination of the appropriate price/earnings ratio for growth stocks as compared to ‘standard’ stocks. His empirical research attempted to identify the financial variables that affect price/earnings (P/E) ratios and showed that the expected price-earnings ratio of a particular time depends upon the price-earnings ratio of the preceding period.

(Bones, Chen, & Jattusipitak, 1972) found that changes in capital structure, however, cause changes in parameters of the random walk. At the time a change in the capital structure was announced, a shift in the process toward new parameters commences. This established the theory that stock price movements are affected by changes in the capital structure.

(Bierman J. H., 1982) considered an accounting model in which price-earnings ratio is made independent of growth rate. He empirically proved that price-earnings ratio is greatly affected by the discount rate, changes in the market rate of interest and changes in the cost of equity capital.

2.2 Capital Asset Pricing Model (CAPM)

The value of a firm is affected by two key factors –risk and return. Higher the risk, other things being equal, higher the return and vice versa. Return from an investment is defined as the

realizable cash flow earned by the investor during a given period of time. Typically it is expressed as a percentage of the beginning-of-period value of the investment.The risk is defined as the dispersion of probable returns. A simple measure of dispersion is the range of possible outcomes, which simply the difference between the highest and lowest outcomes. A more sophisticated measure of risk employed commonly in finance in the standard deviation. But what will happen when more and more securities are added to the portfolio? It has been proved that the portfolio risk will decrease and approach to a limit. Empirical studies have suggested that the bulk of the benefit from diversification, in the form of risk reduction, can be achieved by forming a portfolio of 15-20 securities. Thereafter, the gains from diversification are negligible.

Diversification risk (also referred as unsystematic risk or non-market risk) of a security arises from the firm's specific factors such as the emergence of new competitor, plant breakdown, non-availability of raw materials etc. Events of this kind primarily affect a specific firm, not all firms in general. Therefore, such risk can be reduced by adding several securities in the portfolio.

Non-diversifiable risk (also referred as systematic risk or market risk) of a security arises from the influence of certain economy-wide factors such as money supply, government policy, inflation, government spending and industrial policy. Since such factors affect all firms, investors cannot avoid risk arising from them, whatever the level of diversification may be. In other words, such risks cannot be diversified away. So it is called as non-diversifiable risk or market risk (as it is applicable to all securities in the market), or systematic risk (as it systematically affects all securities).

Investors usually hold diversified portfolios from which the diversifiable risk is more or less eliminated. Hence the relevant measure of risk of an investment is the systematic risk, as it

systematically affects all securities. But the question is: Do all securities have the same degree of systematic risk? The answer is:All securities do not have the same degree of non-diversifiable risk because the magnitude of the influence of external factors tends to vary from one firm to another. Different securities have different sensitivities to variations in market returns.

Now, how is this non-diversifiable risk measured? It is generally measured by 'Beta'. Beta represented most widely accepted a measure of the extent to which the return of a financial asset fluctuates with the return on the market portfolio. Therefore, by definition, the beta of the market portfolio is 1. A security of beta 1.3 experiences a greater fluctuation than the market portfolio. More precisely, if the return on the market portfolio is increased by 10%, the return of a security of beta 1.3 is expected to increase by 13% (1.3 x 10%). On the other hand, a security which has a beta of 0.70 fluctuates lesser than the market portfolio 7% (0.7 x 10%).

Capital Asset Pricing Model (CAPM) describes the relationship between systematic risk of a security and its return. It is evident that, ceteris paribus, the higher the beta, the greater the required rate of return and vice versa.

The two parameters defining the security market line are the intercept (risk-free rate of return) and the slope (market premium). The intercept represents the nominal rate of return on risk-free security i.e. government bond. The slope represents price per unit of risk and is a function of risk aversion of investors. If the risk-free rate of return changes, the intercept of the security market line changes. If the risk-aversion attitudes of investors change, the slope of the security market line will also change.

Though CAPM is not a pure valuation model, it is the basic relationship which values the cost of equity capital (k), which is used as a discounting rate for valuing equity share.

The assumptions underlying the standard Capital Asset Pricing Model (CAPM) are:

- There is no transaction cost
- The asset is infinitely divisible
- There is no personal income tax
- An individual cannot affect the price of a stock by his buying or selling action
- Investors are expected to make decisions solely in terms of expected value and standard deviations of returns on their portfolios
- Unlimited short sales are allowed
- Unlimited lending and borrowing are allowed at the riskless rate
- Investors are assumed to be concerned with the mean and variance of return
- All investors are assumed to define the relevant period in exactly the same manner
- Investors are assumed to have identical expectations in relation to the required inputs to the portfolio decision
- All assets are marketable

Beta, a product of academic research, was initially viewed with suspicion by the investment community. It became very popular in the 1970s and the investment industry in the US began to explore beta on a large scale. Along with the spread of the beta concept, the CAPM theory and its various extensions were subject to more rigorous and comprehensive scrutiny and testing. Several issues have been raised in this regard. How stable is beta? Is the relationship between systematic risk (as measured by beta) and return stipulated by the Capital Asset Pricing Model? What are the factors that have an influence on beta?

While categorical answers to the above questions are not available, however, extensive research done to date suggests the following:

- There is a fundamental problem in testing Capital Asset Pricing Model, as true market portfolio cannot be measured and Capital Asset Pricing Model cannot be tested accordingly.
- While betas of individuals are unstable, betas of portfolios are fairly stable.
- The relationship between systematic risk (measured by beta) and return is flatter than that explained by Capital Asset Pricing Model. That is, low beta stocks can earn a higher return than that stipulated by Capital Asset Pricing Model, whereas high beta stocks can earn a higher return than that stipulated by Capital Asset Pricing Model.
- In addition to beta, some other factors such as total risk (standard deviation of historical return) and company size too can have an influence on the realized rate of return.

The research conducted a study on the validity of the CAPM model in context of Indian stock market in the post-liberalization era during 1996–2015. The objective of the research was to verify if the risk and systematic risk showed a positive relationship during the mentioned time frame.

Both Capital Asset Pricing Model (CAPM) and Single Index Model, though not valuation models in the true sense of the term, help in the evaluation of a stock's expected return. The model helps to arrive at a theoretically correct required rate of return of a stock, if it is to be tagged to a portfolio that is already well-diversified, given that stock's non-diversifiable risk. The model considers the stock's exposure to non-diversifiable risk (also known as market risk or systematic risk), usually represented symbolically by a measure beta (β). Beta calculates the

sensitivity of a stock in relation to the market or its nearest proxy. It also measures the expected return of the market and of a theoretically risk-free stock. The model holds that the cost of equity capital on the part of the investor is determined by its beta (Fama & Kenneth, 2004) and (Sharpe, 1964)**.** Despite the introduction of new asset pricing models and new approaches to portfolio selection, CAPM continues to be popular among analysts and market-watchers owing to its ease of applicability in diverse situations. However, recent studies in India as well as in America have proved that the results are sometimes contradictory.

CAPM faced heavy criticism in the 1970s after glaring inconsistencies of the model were revealed. It was reported that firm characteristics such as P/E multiple, book-to-market value, firm size and prior return performance can better explain cross-sectional variation in returns. One major inconsistency as revealed by (Basu, 1977) is linked to the P/E effect. Companies with low P/E multiple gave high sample returns and companies with high P/E multiple ratios yielded lower returns than were justified by beta. An empirical inconsistency of the model in relation to size effect was reported by (Benz, 1981). He found that the explanation of the cross-section of average returns is amplified by market capitalization. In recent years, Fama and French (1988 and 2004) announced that beta as the only explanatory index of stock return is obsolete. They reported that portfolios based on a ratio of book value to market value and size yield greater returns than what is suggested by CAPM.

(Srinivasan & Narasimhan, 1988) holds that CAPM relationship is applicable for a large sample to derive meaningful inferences. (Varma, 1988) in his results also finds ample support for CAPM. (Yalwar, 1988) reports that CAPM successfully describes stock returns, despite his investigation being based on individual stock returns and not portfolio returns. (Gupta & Sehgal, 1993) examined the case of non-linearity and the importance of residual risk in the explanation

of returns. Their conclusion was that CAPM could not be a correct descriptor of stockpricing in the Indian market. The risk-return relation over the period is positive, but weak and insignificant. (Ansari, 2000) drew statistics from the Indian market context in the early years of economic liberalization and concluded that the postulates of CAPM stand justified. The above reports reveal that the sensitivity of the results to holding periods must be considered; a relatively long span of study and a large sample may cast aside some aspects of empirical failures. Thus, any conclusive theory or report should be preceded by robustness. (Madhusoodanan, 1997) also failed to find a consistent link between return and risk, the low-risk portfolio produced a comparably higher return while the high-risk portfolio yielded a minimum return. He stated that high risk and high return formula will not yield positive results in the context of the Indian market and so it's better to choose low-risk stocks. (Madhusoodanan, 1997) states that as more investors tailor their portfolio and opt for low-risk stocks, a much deeper link between risk and return may develop. These studies put CAPM under the scanner and reveal the volatility and unpredictability of the Indian capital market.

2.3 Efficient Market Hypothesis

One of the dominant ideas in academic literature has been the concept of 'Efficient Capital Market' since the 1960s. Though the concept of the Efficient Capital Market has changed during different time periods, the basic idea of the meaning of efficiency is whether stock prices fully reflect all available information. (Fama E. , 1970) in a classic paper contributed a great deal to define the concept of market efficiency, each of which is based on different types of information available in the market. Fama expressed Efficient Market Hypothesis (EMH) in a phrase "A market in which prices fully reflect all available information is called efficient". There are three

major versions of EMH considering the nature of information available in the market. They are a) weak b) semi-strong and c) strong form.

Weak form tests whether all information contained in the historical prices is fully reflected in the current prices. Semi-strong form tests whether all publicly available information is fully reflected in the current prices. Strong form suggests the fact that market at any point of time fully reflects all information (public or private) in stock prices. In an efficient market, the market value is an independent and unbiased estimate of its intrinsic value. Therefore, the investors'chances of consistently drawing excess returns are almost negated. In support of this proposition, it was observed that fund managers underperform a combination of passive indices combined to have the same risk after management fees and expenses are taken into account (Elton J. Edwin J., 1990). This could also probably be due to the reluctance of fund managers to take exposure in small-cap stocks which evidently have excess returns when measured relative to the CAPM or even justify their fees and expenses they incur.

However, even in the US which symbolizes the epitome of strong form, excess returns have been identified over varying time periods. Though existing research has failed to explain this inconsistency, the source of excess return is probably due to 'superior' use of publicly available information rather than monopoly access or even insider trading. In support, past studies by (Jaffe, 1974) and (Lorie & Neiderhoffer, 1968) found patterns of excess returns which could be due to trading based on privileged information, unless these traders happened to possess superior analytical skills, both of which seems equally likely. This is particularly true, given the increasing trend of Wall Street deploying the services of 'rocket scientists' and using high-end analytics and optimization tools to manage their risks. On the overall, research indications are

that the US stock market scores high on informational efficiency. However, the presence of market rationality across all investor segments cannot be necessarily presumed.

Market volatility tests by (Leroy & Porter, 1981) and (Shiller, 1984) (Shiller, 1981) also confirm the above proposition. Volatility tests examine the volatility of stock prices relative to the volatility of their intrinsic value. Markets are said to be inefficient if market values of stocks in general display volatility which defies its fundamentals. An analysis of forecasts by a large number of independent advisory services revealed that a change in classification either upward or downward generated excess returns, which was also found to be sustainable and not a mere correction. Acting on changes in classification produced larger excess returns than acting on the recommendations themselves. In addition, no superior forecasters could be identified. Investors were better off following the advice of average or consensus forecasts rather than following the advice of a set of forecasts based on their past track record. Furthermore, (Stickel, 1985) found that the market displayed more volatility than the fundamentals on which advisory services were based. This substantiates our earlier point regarding the evidence of analysts having information not fully incorporated in stock prices or a confirmation of market rationality. These studies assume importance because this is the most basic form through which the financial community at large receives information. Therefore, valuation and its subsequent refinements make sense, even in efficient markets like the US to generate excess returns, even if not on a consistent basis.

In addition to information efficiency, (Fama E. , 1970) considers the semi-strong form with the speed at which information discounts in stock prices. This refers to event studies or studies of announcements and its subsequent impounding in stock prices. A potential lag between an announcement and its impact is an impediment to market efficiency and creates a potential opportunity to trade in stocks and generate excess returns. The semi-strong form does not deny

the presence of value-based information, nor does it deny the impact it creates on stock prices. It supports the view that excess returns are possible by taking advantage in the inefficiencies in discounting process. If returns are not predictable from past returns, then new information is incorporated in stock prices sufficiently fast so that an investor could tell from the price movements themselves that there had been a fundamental change; the fundamental change is already reflected in the price. However, since the efficient form argues that return forecasts are indeed possible from the past returns, there is a potential delay in fundamental changes being reflected in price changes. Results from a wide range of 'event studies' affirms that markets are by and large, efficient with regards to routine announcements such as dividends, rights, stock options, etc. (Kraus & Stoll, 1972)**;** (Grier & Albin, 1973)**;** (Dodd, Ruback, & Richard, 1977). However, there exists significant asymmetry with regards to strategic announcements such as M&A or otherwise, which takes a significantly longer duration of its obvious analysis and impact (Firth, 1975). (Davies, LLoyd, & Michael, 1978) also supports this view and points towards the definite presence of such inefficiencies in Asian markets, if not in the US as well.

Under the classification of anomalies or patterns (high or lows) in returns being identified from past data, (Fama E. , 1970) identified excess returns in January and on Mondays in the US. On the lines of these tests, this research on Indian markets spanning from 1991 to 2015 clearly indicates significant excess returns in November. November is historically the month in which Diwali is celebrated (marking the start of the Indian financial year for a vast section of the Indians, and for the stock broking community in particular). It is at this point of time that investors square off their past transactions, strike new deals and take fresh positions, traditionally thought to be auspicious. This pushes up the volumes and results in distinctively excess returns. The same phenomenon has been observed in case of other product markets too. In the gold

bullion market in India (which coincidentally also accounts for about 50% of global consumption), excess returns have been observed in the months of April and November. Both these months are considered to be auspicious from the religious point of view as they mark the dedication to the god/goddess of wealth and prosperity; popularly known as AkshayTritiya and Dhanteras. It requires little market rationality to know that these events spark off buying behavior and have the distinct potential to generate excess returns; no wonder the logic also undermines the deep linkage between business and religion in India. The above studies indicate the strong possibility of valuation studies being used in slightly weaker markets such as Asia to generate excess returns. However, it needs to be mentioned that models developed in the Western context cannot be applied in its exact form without sufficient customization. Models developed in one context may not work in other contexts because of methodological and behavioral issues, as explained earlier.

The weak form tests whether all information at all gets fully discounted in stock prices over a reasonable period of time. According to extant research, most Asian markets (including India) score low on informational efficiency as well as market asymmetry. The indication of a one-sided skewness is another dimension of low efficiency. It should be pointed here that the period of study assumes significance due to the fact that the Government of India adopted various liberalization measures in 1991. However, findings in the Indian context are not free from dichotomies either. (Barua, 1981) in his paper using runs test and serial correlation tests found preliminary evidence suggestive towards market efficiency in India. However, the general consensus is that Indian markets score low on efficiency with regards to Western contexts.

It should be noted here that (Roll & Ross, 1994) pointed out that efficiency and ‘randomness’ displays one-way causality. Efficient markets are expected to display randomness, but

randomness, per se may not be due to efficiency. This is a critical insight for future research. We conjecture that Indian markets display randomness due to reasons different from Western contexts. The presence of a high degree of 'soft' infrastructural bottleneck prevents the free flow of information in an economy. Low internet penetration and slow bandwidth in India is a clear indication in this regard. Further, low financial literacy (a factor which acts as an impediment to efficiency) is clearly widespread. The continued presence of 'ponzi' schemes despite over two decades of liberalization is another pointer in this regard. Most retail investors hold undiversified portfolios indicating the presence of diversifiable risk as well. Liquidity is possibly another serious problem faced by Indian investors; a consultative paper by SEBI indicated a poor liquidity situation at the stock exchanges in India. The Pareto's 80:20 rule aptly applies here as well; 80% of the liquidity finds way 20% of the stocks. Insider trading and lack of transparency still persists. Adequate computerization has taken place, but the market is basically driven by FII investments. Hot money basically flows into avenues for purposes beyond risk and return, also justifies our view point. With the presence of multifarious inefficiencies in the Indian context, it might be quite possible that any amount of customization of valuation models may still reveal inconsistent and insignificant results.

The weak form of efficiency is based on the concept of '*Random Walk'*. The '*Random Walk'* model assumes that successive returns are independent and that returns are identically distributed over time. Fama expanded the definition of the first type of efficiency. He changed the classification of weak form tests to the more general category as '*tests of return predictability'*. Under this classification, we will examine patterns in securities returns such as high returns in July and November and lower returns in March, as well as whether returns can be predicted from past data. Consistent with this new classification, Fama has changed 'semi-strong form of

efficiency' to event studies or studies of announcement, and this classification has been adopted. Tests of the predictability of returns (formerly tests of the weak form of the efficient market hypothesis) are in part tests of whether this type of trading behavior can lead to excess profit. The strong form of the efficient market hypothesis states that there are no investors with this superior ability. Since it is impossible to determine exactly how investors might utilize the announcement to reassess the value of the firm, tests of the strong form of that efficient market hypothesis are examinations of whether an investor or group of investors have earned excess returns.

An efficient securities market exhibits few behavioral traits or characteristics:

- Security prices respond rapidly and accurately to new information
- Changes in expected returns are driven by time-varying interest rates and risk premium
- Changes in stock prices driven by other events should be random
- Trading rules fail to produce superior returns in simulation experiments
- Professional investors fail to produce superior returns individually or as a group

Efficient Markets Hypothesis (EMH) has its genesis in the ground breaking theoretical study of (Bachelier L. , 1900)**.** In his seminal doctoral thesis, Bachelier suggested the *random walk* as the core model for financial asset costs. This was a couple of decades before other researchers mostly accepted the idea. The modern literature was initiated by Samuelson, who proved that in efficient markets, asset prices exhibit random fluctuation in response to the latest information.

In an 'efficient' market that thrives on competition, any new update/ information on intrinsic values will be reflected almost instantly in actual prices. Since there is still a little uncertainty regarding new information, 'instantaneous adjustment' carries two implications. First, changes in intrinsic values will see actual prices initially over-adjusting to the changes, as often as under-

adjusting to the same. Second, the lag in full adjustment of actual prices to successive new intrinsic values will itself be a random, independent variable, with the adjustment of actual prices sometimes happening before the occurrence of the event which forms the basis of change in intrinsic values (i.e. when the event is foreseeable by the market), and at times following the event's occurrence.

This means that 'instantaneous adjustment' is a characteristicof the 'efficient market', which suggests that in individual securities, successive price changes will be independent. A market showing such trend is known as a random-walk market. The theory of random walk suggests that a series of stock price changes, have no memory, i.e., the future of the series cannot be predicted by studying its past history/ records. The independence assumption of the random walk model is valid as long as knowledge of past behavior of the series of price changes cannot be used to increase expected gains. If successive price changes of a certain security are independent, no problem is encountered in timing sales and purchases.A simple policy of purchase and sale of the security will be as effectiveas a complicated process of timing.

The random walk theory has undergone many empirical tests over the years. The tests have mainly been directed at testing the idea that successive price changes are independent. The approach was based on general statistical tools such as serial correlation coefficient and study of consecutive price change runs of the same sign. If the statistical tests are inclined to support the assumptions of independence, it can be concluded that there are no chartists techniques or mechanical trading rules, based purely on patterns seen in past records of price changes, which can increase the anticipated profits of investors than they would have increased with a common buy-and-hold policy. The second method of testing independence begins by direct testing of

various rules of mechanical trading in order to examine if they produce profits higher than common buy-and-hold.

Researchers have mostly focused on the statistical approach to test independence. This approach has yielded encouraging and consistent results while studying the US stock market. In general, these researches have mostly upheld the random walk theory. A few examples in this context are the serial correlation tests of (Cootner & Paul, 1962)**,** (Fama E. , 1970)**,** (Kendall, 1953) and (Moore, 1962)**.** In all these tests, the sample serial correlation coefficient computed for successive price changes were nearly close to zero. This is strong evidence that goes against important dependence in the changes.

Fama described two approaches to predict stock prices:

(1) 'Chartist' or 'technical' theories

(2) Theory of fundamental or intrinsic value analysis

The basic premise of all technical or chartist theories is that past trends in the price movement of individual securities will possibly be repeated in future. Therefore, an analyst would approach such techniques with the assumption that successive price changes in individual securities are dependent. In other words, a sequential series of price changes, prior to any particular day can help in foreseeing the price change of that day. The fundamental analysis approach assumes that an individual security bears an intrinsic value at any point of time – a value which is dependent on the security's earning potential. The earning potential depends in turn on many core factors such as industry outlook, quality of management, etc.

Chartists' theories are based on an implicit assumption that certain dependencies exist in a series of successive price changes, i.e. the series of past performance can be used to make certain

predictions about the future. On the other hand, the theory of random walks states that successive price changes are entirely independent. In other words, past data cannot predict future performance. The validity of the random theory is supported by empirical evidence, which also states that the chartist's theory has no real value to the investor.

(Fama E. , 1970) also explained that analysts will do better than investors who follow a simple buy-and-hold policy as long as they can more quickly identify situations where there are non-negligible discrepancies between actual prices and intrinsic values. Analysts are in a better position to predict the occurrence of important events and evaluate their effects on intrinsic values.

Finally, (Fama E. , 1965) concluded that the random walk theory challenges the predictions of both chartists and fundamental analysts. If the random walk model holds true for stock markets, the work of the Chartists in stock market predictions loses all significance. The random walk theory is also backed by empirical evidence. Secondly, if the random walk theory is valid, and the security exchanges are 'efficient' market, then stock prices at any point in time will represent a good estimate of intrinsic or fundamental values. Therefore, the additional fundamental analysis is of value only when the analyst has new information which was not fully considered in forming current market prices, or has new insights concerning the effects of generally available information which are not already implicit in current market prices. If the analyst has neither better insights nor new information, he can select securities by using the random selection procedure without using his fundamental analysis.

(Emery, 1974) compared the relation between reported accounting income and prices with the relation between certain adjusted (unsmoothed) income series and prices. If the market is

efficient and alternative sources of information are available, a stronger relationship between unsmoothed income and prices than between reported income and prices would suggest that the market can decide for itself what the correct accounting numbers should be. Alternatively, evidence that the manipulation of accounting numbers can influence prices implies the existence of optimal strategies for disclosing information. The success of such strategies has implications for both management and investors. The paper examines the relationship between reported accounting income and prices with the relation between certain adjustment to the reported income series and prices. The simulation procedures used to transform the reported accounting numbers provide evidence that some firms in the chemical and auto parts industry may have manipulated accounting numbers to report a smoother earnings trend than would have existed without such accounting adjustments. The significant negative relations for the chemical industry, in particular suggested that enough of the information contained in accounting numbers is available through alternative sources so that the market can estimate what the correct accounting numbers should be and price the stock accordingly. Emery concluded that there was some evidence that the market was able to rely on sources of information other than accounting numbers. The implication found was that 'earnings manipulation may be fun, but its profitability is doubtful'.

(Finnerty, 1976) described the purpose to develop a factor analysis/multiple discriminant analysis model to search for the existence of relationships between insiders trading and the subsequent announcement of financial and accounting results or important news. The important news could be (1) obtaining of favorable government contract, (2) discovery of new raw materials or patentable processes, and (3) increase in dividend payments.

Finnerty says:"The factor analysis/multiple discriminant model indicates not only that insiders do rely on future financial and accounting information, but that, in their decisions to buy or sell, the relative magnitudes of the information are also important. Insiders who have decided to buy are purchasing the securities of companies, distinguished by smaller size, larger earnings, and larger dividends compared to those companies whose securities the average insiders are selling. The point is that in individual situations, certain insiders may be basing their decisions to buy or sell on other information in the insiders' information set. However, the average insiders' actions are certainly related to the profile variables with more than mere chance. The systematic identification of the characteristics of the buying and selling groups is an important first step in identifying and quantifying the information set which insiders use and which allows them to perform better than the market."

(Fama, Fisher, & Roll, 1969) studied the method by which general stock prices adjust to the implicit information in a stock split. They discovered that stock splits are quite often linked to substantial dividend increases. The study revealed that the market realizes this and announces a split to re-examine the flow of possible income from the shares. Moreover, the study revealed that on an average the market judgments about the information implications of a split are fully mirrored in the price of a share at least by the close of the split month but usually almost immediately following the announcement date. The study supported the conclusion that the stock market was 'efficient' in the sense that stock prices adjust very rapidly to new information. The evidence also showed that the market's reaction to a split is essentially a reaction on its dividend implications, i.e. the split causes price adjustments only to the extent that it is linked to changes in the expected level of future dividends.

(Fama E. 1970) reviewed the theoretical and empirical study of the efficient capital market. He also defined the market in which prices always 'fully reflect' available information as'efficient'. In this paper, Fama reviewed the theoretical and empirical literature on efficient market model. He also defined the adjustment of security prices to three relevant information subsets. The first is the 'weak form' test, in which the information set is just historical prices. The second is the 'semi-strong' test, where the concern is whether prices efficiently adjust to other information that is publicly available (e.g. Announcement of annual earnings, stock splits, etc). The last subset is the 'strong form test', concerned with whether given investors or groups have monopolistic access to any information relevant for price formations.

The weak form tests of the efficient market were most voluminous, and it seemed fair to say that the results were strongly in support. Though statistically significant evidence for dependence in successive price changes or returns had been found, some of this was consistent with the 'fair game' model and the rest did not appear to be sufficient to declare the market inefficient. At least in the price changes or returns covering a day or longer, there wasn't much evidence against the 'fair game' model's more ambitious offspring, the random walk. There was consistent evidence of positive dependence on day-to-day price changes and return on common stocks, and the dependence is of a form that can be used as the basis of marginally profitable trading rules. The dependence showed as serial correlations that are consistently positive, but also close to zero. Evidence in contradiction of the 'fair game' efficient market model for price changes or returns covering periods longer than a single day was more difficult to find. Other existing evidence of dependence in returns provided interesting insights into the process of price formation in the stock market, but it was not relevant for testing the efficient markets model. The test showed that large daily price changes tend to be followed by large changes, but of unpredictable sign. This

suggested that important information could not be completely evaluated immediately, but that the initial first day's adjustment of prices to the information was unbiased and sufficient for the Martingale Model. Semi-strong form of tests, in which prices are assumed to fully reflect all publicly available information, also supported the efficient market hypothesis. It was found that information on stock splits concerning the firm's future dividend payments was fully reflected in the price of a split share at the time of the split. Similar results were found with respect to the information contained in (i) annual earnings announcements by firms, and (ii) new issues and large block secondary issues in common stock.

Strong-form efficient market model, in which prices are assumed to fully reflect all available information, was probably best viewed as a benchmark against which deviations from market efficiency can be judged. Two such deviations were observed. First, specialists on major stock exchanges have monopolistic access to information on unexecuted limit orders and they use this information to generate trading profits. Secondly, corporate insiders often have monopolistic access to information about their firms. In short, the evidence in support of the efficient market was extensive.

(Finnnerty, 1976) described the results of the test the strong form of market efficiency. He tested the strong form of market efficiency and determined whether insiders earn better-than-average profits from their market transactions. He tried to ascertain if the market is truly efficient and determine how well insiders do relative to the market in general. From the results it was apparent that in the short run insiders were able to identify profitable as well as unprofitable situations in their own companies. A comparison of the magnitude and sign of these results indicated agreement as to the direction of insider returns. The result summed up was that insiders were able to outperform the market. Insiders could do identify profitable and unprofitable situations

within their corporations. This finding tends to refute the strong form of the efficient market hypothesis.

(Grossman, 1976) analyzed a market where there are *n* types of informed traders and each got a 'piece of information'. In a simple model, he studied the operation of the price system as an aggregator of the different pieces of information. He concluded that in an economy with complete markets, the price system did not act in such a way that individual, observing only prices and acting in self-interest, generated allocations which were efficient. However, such economies need not be stable because prices revealed so much information that incentives for the collection of information were removed. The price system could be maintained only when it was noisy enough so that traders who collected information could hide that information from other traders. When this occurred, some traders wanted very much to know why prices were so high. It was enough for traders to observe only prices.

(Grossman & Shiller, 1981) considered whether the variability of stock prices can be attributed to information regarding discount factors, (i.e., real interest rates), which is in turn related to current and future levels of economic activity. They stated that "The appropriate discount to be applied to dividends which are received *k* years from today is the marginal rate of substitution between consumption today and consumption *k* periods from today."They also concluded that the most familiar interpretation for the large and unpredictable swings that characterized common stock price indices is that price changes represent efficient discounting of 'new information'.

Indian market, however, scores low on informational efficiency as well as market asymmetry.

(Ragunathan, 1987) tested the market efficiency in India based on actual returns. Their results indicate that the Indian capital market is inefficient in pricing its stocks. Similar views find support in the works of (Rao, 1988) and (Maheswari G E, 1989) as well. (Obaidullah, 1990) noted that daily returns as well as Sensex (a market proxy) returns differed significantly from normality whereas monthly Sensex returns were not significantly different from a normal distribution. The monthly returns were positively skewed and leptokurtic but not statistically significant. (Raghunathan & Barua, 1990) in a small sample study concluded that on an average, shares are overvalued in the Bombay Stock Exchange.

(M Raja, 2009) attempted to test the efficiency of Indian stock market with respect to a stock split announcement by IT companies. They concluded that the stock split announcement made by sample IT companies contained information useful for valuing the securities. The market reacted quickly during the post-split announcement and the reaction extended up to +15 days for a stock split announcement by IT companies. They also found that the information about a stock split announcement could have been used by investors for making abnormal returns at any point of the announcement period, through the strategy of short selling.

(Shania Taneem, 2011) in the research article 'Information Content of Dividend Announcements: An Investigation of The Indian Stock Market' examined the dividend information, content hypothesis and stated that stock returns are triggered by dividend changes because they mirror changes in the management's predictions of a company's future profitability. They classified the dividend announcement into either favorable or unfavorable decision. Moreover, they found that dividend policy of companies in the emerging market is very different from the widely accepted dividend policies operating in developed countries. They examined the information content of dividend announcements and price movements in the

emerging Indian stock market. They studied the information on dividend policies through the share price reaction of 82 firms in India that were enlisted in BSE during 2004–2007. They found that investors had a favorable reaction towards companies that increased their dividends, and vice versa for companies that declared a decrease in dividend, and concluded that dividend announcements have information content and can, by themselves, induce share price adjustments. The results of the study also showed that companies that increased their dividend amounts had a higher abnormal return and higher cumulative abnormal return, which explained that the market has a favorable impression towards companies paying out higher dividends. Their study strongly supported the dividend-signaling hypothesis and explained positive price reactions to an increase in dividend payments. The result indicates that firms operating in the Bombay Stock Exchange were not an exception, i.e., the stock price will move in the direction of the dividend change.

In the research article 'The Implications for Accounting of Efficient Markets and the Capital Asset Pricing Model', (Bierman J. H., 1974) concluded the following insights:

- Intrinsic value analysis is essential to the maintenance of an efficient market.
- Even if the market is generally efficient, this does not guarantee that all stocks will be appropriately priced at all times.
- The accounting information supplied is not always reliable.
- The 'news' is being evaluated by a large number of investors being 'experts' and 'non-experts'.
- It is wrong to imply that the systematic risk coefficient 'Beta' is all the information that's needed by an investor.

2.4 Research Gap:

Based on the literature review, the following research gaps have been identified:

- We did not find any references to substantiate that Whitbeck-Kisor model has been tested in the Indian stock market during the post-liberalization era.
- Several tests have been conducted regarding the validity of Capital Asset Pricing Model (CAPM) by researchers in the Indian stock market. However, the results were found to be dichotomous.
- Despite the failure of earlier studies, very little introspection was made into the causal effect which was missing in existing literature.
- Existing literatures have tended to view 'valuation models' and 'Efficient Market Hypothesis' as two mutually exclusive and independent fields of study.
- In view of the above, an attempt has been made in this research to indicate 'Efficient Market Hypothesis' as a possible causal effect.

With the continuous process of transformation of the Indian stock market, there is a need to test the valuation models and the efficiency of the Indian stock market in the post- liberalization period and to formulate a customized valuation model applying multivariate regression analysis. This research tried to find out the relationship between valuation and efficiency of the stock market, which has not been explored or addressed adequately as most researches decoupled the two areas of study as independent and mutually exclusive. This research attempted to integrate the above areas to explain the inconsistencies in existing findings and simultaneously throw open new insights in this field of study.

Chapter 3

OBJECTIVES AND HYPOTHESIS

Chapter 3

Objectives and Hypothesis

3.1 Research objectives

The objectives of the research are:

1. To test a price-earnings (Whitbeck-Kisor) valuation model in context of the Indian stock market during 1996–2015
2. To test the relevance of the Capital Asset Pricing Model (CAPM) in context of the Indian stock market
3. To develop and test a customized valuation model
4. To test the efficiency of the Indian stock market (All three forms)
5. To find if any relationship exist between valuation and efficiency of the stock market

All the three efficiency tests (the weak form, the semi-strong form and the strong form) will be conducted in context of the Indian stock market. The research attempted to throw new insights into the Indian stock market and its behavior. The stock market has undergone a series of changes and it is necessary to test the market efficiency since most of the tests were conducted in context of a developed economy. Moreover, a customized stock valuation model will also help to identify the factors that drive the stock price in the Indian stock market in the post-liberalization era.

Most of the researches that have been carried out in testing efficient market hypothesis are in context of developed market where efficiency levels are significantly higher. Therefore, considering the differential levels of market efficiency, their application in the Indian context is debatable. Also, with the continuous process of transformation of the Indian stock market, there is a need to test its efficiency during the post- liberalization era and to formulate a customized valuation model applying multivariate regression analysis.

3.2 Hypothesis:

3.2.1 To test a price-earnings (Whitbeck-Kisor) valuation model in context of the Indian stock market

Null Hypothesis

$H1_0$: No significant relationship exists between the price-earnings ratio (dependent variable) and growth rate of earnings per share (independent variable), dividend payout (independent variable) and standard deviation of earnings (independent variable).

Alternate Hypothesis

$H1_1$: A significant relationship exists between the price-earnings ratio (dependent variable) and growth rate of earnings per share (independent variable), dividend payout (independent variable) and standard deviation of earnings (independent variable).

3.2.2 To develop a customized valuation model in context of Indian stock market [H11]

Null Hypothesis

$H2_0$: No significant relationship exists between price-earnings ratio (dependent variable) and the independent variables as formulated by the model.

Alternate Hypothesis

$H2_1$: A significant relationship exists between price-earnings ratio (dependent variable) and the independent variables as formulated by the model.

3.2.3 To test the weak form of efficiency of stock market (Regression Test)

Null Hypothesis

$H3_0$: No significant relationship exists between current year's return on S & P BSE 100 Index (T) (dependent variable) and previous three year's return, i.e. T-1, T-2 and T-3 (independent variables)

Alternate Hypothesis

$H3_1$: A significant relationship exists between current year's return on S & P BSE 100 Index (T) (dependent variable) and previous three year's return, i.e. T-1, T-2 and T-3 (independent variables)

Chapter 4

METHODOLOGY

Chapter 4

Methodology

4.1 Data Source:

The data required for this research were both primary and secondary in nature. The secondary data was collected from the following sources:

- Company data from Centre for Monitoring Indian Economy (CMIE)
- Stock market data published by different stock exchanges and websites
- Economic reviews of different government authorities
- Audited balance sheet and profit-and-loss statements of different companies

4.2 Method of collecting data:

Research has been conducted using data that are mostly secondary in nature. For objective numbers 1, 2 and 4, secondary data have been collected from CMIE (Centre for Monitoring Indian Economy) PROWESS database. Additional information was collected from various websites, i.e. bseindia.org, moneycontrol.com, nseindia.org etc. For the formulation of the customized model, i.e. objective number 3, primary data has been collected from individuals who are working in the field of stock valuation in the Indian stock market. A 'feedback form' was sent to 19 mutual fund companies and the customized model has been developed on the basis of feedback received from 10 respondents.

4.3 Period of reference:

The main objective of the research is to test valuation models, develop a customized model and test the efficiency of Indian stock market in the post-liberalization period. Hence a period of 1996–2015 (a period of 20 years) has been selected for the research. However, the Whitbeck-Kisor model was tested for the period 2000–2015 since the standard deviation was calculated for a period of five preceding years, i.e. the standard deviation for the year 2000 was calculated for 1996-2000. The customized valuation model was also formulated for the period 2000–2015 as both the models considered the price-earnings ratio as a dependent variable. Research conducted for the other tests covered a period of 1996–2015. The weak form of efficiency test was also conducted from 1991 to 2015 to cover a wider range of time period.

4.4 Methods and tools of analysis:

4.4.1Test of price-earnings ratio (Whitbeck-Kisor) valuation model in context of Indian Stock Market

Data for the price-earnings ratio (dependent variable) and historical growth rate of earnings per share (independent variable), dividend payout (independent variable) and standard deviation of earnings (independent variable) collected for 100 stocks included in S & P BSE 100 broad-based index. Regression analysis was done using an SPSS 17.0 tool for the above-mentioned data and the result thus obtained analyzed using an F-test.

4.4.2 Test of Capital Asset Pricing Model (CAPM) in context of Indian Stock Market

Beta and return of all stocks are calculated for each year. An equal-weighted portfolio of the stocks is formed and grouped in deciles. All stocks are grouped into 10 deciles and an average return of the stocks included in the group calculated. Ranks are assigned to each group for beta and return. Groups are arranged from the higher rank to a lower rank of beta and'd' is calculated as the differences in ranks of beta and return. The risk-and-return relationship is explored by using Spearman's Rank-Order Correlation formula.

4.4.3 Developing a customized valuation model in context of Indian stock Market

The process followed is a 'primary survey' among the eligible and qualified professionals who are working in the field of equity research for a considerable period of time in the Indian stock market. They were asked a question, "What factors do you consider are affecting the price-earnings ratio of Indian stocks during 2000–2015?" From the feedback obtained from respondents, the quantitative variables were identified and data were collected from the CMIE Prowess system from 2000–2015 for stocks included in the BSE 100 index. Stepwise regression analysis was carried out using an SPSS 17.0 tool, taking price-earnings ratio as dependent variable and other nine quantitative factors as independent variables. By using stepwise regression analysis by SPSS 17.0 tool, the customized model was developed which shows the

optimum value of R-Squared observed for beta, debt-equity ratio, and age as the independent variables.

4.5 Test of Whitbeck-Kisor model

- Data collected for a period of 1996–2015, however, regression analysis carried out for the period of 2000–2015
- The Whitbeck-Kisor model is based on the projected growth rate of earnings of firms, whereas the research is based on historical growth rate of earnings (percentage terms)
- Standard deviation is calculated on the current year and previous four years of earnings per share
- Dividend payout is calculated as equity dividend/earnings per share
- Data set cleaned by the following method:

➢ Negative PE ratios are removed from the data set since loss-making companies are ignored.

➢ Mean and Standard Deviation are calculated for each variable data set

➢ Data falling in the range outside (Mean +_ 3 S.D.) have been considered outliers

➢ Outliers have been removed

The Null Hypothesis

Ho: No significant relationship exists between price-earnings ratio (dependent variable) and growth rate of earnings per share (independent variable), dividend payout (independent variable) and standard deviation of earnings (independent variable).

4.6 Test of Capital Asset Pricing Model (CAPM)

- Stocks included in BSE 100 have been considered
- Daily return on BSE 100 and stocks calculated from 01.01.1996 to 31.12.2015
- Dividend received by stocks and index is ignored
- Beta calculated on daily return of stocks and market index for each year
- Return on BSE S & P 100 index considered as market return
- Stocks divided into deciles for each year on the basis of beta
- Beta and return of all stocks calculated for each year
- Equal-weighted portfolio of stocks comprised each decile
- All stocks grouped into 10 deciles and an average return of the stocks included in the group calculated
- Ranks assigned to each group for beta and return
- Groups arranged from higher rank to a lower rank of beta and 'd' calculated as the differences in ranks of beta and return
- Risk-return relationship explored by using Spearman's Rank-Order Correlation formula

4.7 Stock Valuation Model:

The third part of the research is to build a stock valuation model in the context of Indian stock market for the period of 2000-2015, considering the same span of time when the Whitbeck-Kisor model has been tested. The process followed is a 'primary survey' among the eligible and

qualified professionals who are working in the field of equity research for a considerable period of time in the Indian stock market. They were asked a question, 'What factors doyou consider are affecting the price-earnings ratio of Indian stocks during 2000-2015?' Feedback forms were sent to 19 mutual funds companies which contribute 93% of the total Assets under Management (AUM) of the Indian mutual fund industry. However, ten responses were obtained from the respondents, which can be summarized in two different categories–quantitative and qualitative.

Table:4.1

AUM ANALYSIS ACROSS AMCs (MARCH 2015)					
	AMC AUM as % of Industry AUM	Nos of AMCs	AMC AUM Range (Rs Cr.)	Group AUM as % of industry AUM	Cumulative AUM as % of industry AUM
Group I	10% - 14%	4	110000-150000	49%	49%
Group Ii	5% - 10%	3	60000-80000	20%	69%
Group Iii	2% - 5%	6	20000-50000	18%	87%
Group Iv	1% - 2%	6	10000-20000	6%	93%
Group v	< 1%	25	30-8000	7%	100%

Source: Assocham report on 'Indian Mutual fund Industry The Road Ahead Nov 2016

Table: 4.2

Feedback received from the respondents-Quantitative factors

Respondent No	Quantitative Factors						
1	ROE	Capital Allocation			Consistency of earnings	Inflation	10 year G-Sec
2	ROCE	Debt Equity Ratio				Interest rate	Positive operating cash flow
3	ROCE			Expected rate of earnings growth		Low Float	High free cash flow
4	ROE/ROCE	Debt Equity Ratio		Projected earnings growth	Consistency of earnings/Surety of earnings		
5	ROE			Expected rate of earnings growth		Beta	Depreciation calculated method
6		Capital Structure		Revenue Growth			
7			ROI	Growth of PAT			Dividend per share
8		Capital Structure	ROI	Profit growth rate			
9		Debt Equity Ratio	ROI				Age of the Co
10	ROE	Debt Equity Ratio					Interest Cverage Ratio

Source: Compiled data

Table: 4.3

Feedback received from the respondents-Qualitative factors

Respondent No	Qualitative Factors				
1	Corporate Governance				
2	GDP Growth	Demand Supply Dynamics			
3	MNC Premium	Technological Premium			
4	Quality of Management	Cyclicality			
5	Quality of Management				
6	Government issues		Brand Value		
7	Brand Value	Diversification of business	History of the management of the Co		
8	Product diversification	Brand Image	Composition of the Board of Directors	future prospect (amalgametion/ acquisition)	
9	Nature of the industry (Demand/Supply gap)	Government Policy	Brand Valuation	Quality of Management	
10	Management Policy	Future Plan			

Source: Compiled data

Therefore, as per feedback received from the respondents, we can summarize that the quantitative variables affecting the price-earnings ratios of a particular stock are:

Price-earnings ratio = *f* (ROE, ROCE, ROI, Debt-equity ratio, Float, Beta, Net cash flow, Interest coverage ratio, Age of the firm).

Return on Equity (ROE): The profit after tax less preference dividends is taken as the numerator of this ratio and the denominator include all contributions made by equity shareholders (paid-up capital + reserves and surplus). The ROE ratio measures the profitability per unit of equity funds invested in the firm. It is considered to be a very important measure because it reflects the productivity of the ownership capital employed in the firm.

Return on Capital Employed (ROCE): The numerator is the operating profit instead of net profit as considered in the Return on Equity formula. It represents the ratio of the operating profit in proportion of the shareholders' equity and is widely used as a profitability ratio.

Return on Investment (ROI): It is measured as the earnings before interest and taxes upon the investment made by the company. ROI is the measure of business performance and verified if it is internally consistent. It abstracts away the effect of financial structure and is eminently used for inter-firm comparison.

Debt-equity ratio: Financial leverage refers to the use of debt finance by a firm. Debt finance is a cheaper source of finance, but more risky. Leverage ratios help in assessing the repayment risk arising from the use of debt capital. It is represented as the proportion of total debt, short term as well as long term to owners' equity, i.e. the equity capital plus reserves and surplus. In general, the lower the debt-equity ratio, the higher the degree of protection enjoyed by the creditor.

Float: Float is measured as the percentage of shares that is traded in the market. For example, if the promoters acquire 70% of the total share capital of a firm, then the float is only 30%. A low float is supposed to result in a higher price-earnings ratio because of more demand of the tradable shares.

Beta: Beta is representative of the systematic risk of a firm. It is calculated by the covariance of return of the stock and market portfolio upon the variance of the market portfolio. It tells us how risky the performance of a stock is in the market with respect to the movement of the market.

Net cash flow: The net cash flow shows the i) Source of cash, ii) Uses of cash, and iii) Net change in cash. Sources of cash are the source of working capital plus changes in the working capital account which augment the cash resources of the business. Changes in the working capital are simply the decrease in current assets other than cash. Uses of cash are the uses of working capital plus changes within the working capital which deplete the cash resources of the business.

Interest coverage ratio: Interest coverage ratio is another kind of leverage ratio, which shows the relationship between debt-servicing commitments and the source for meeting this burden. Interest coverage ratio is represented as Earnings before Interest and Taxes (EBIT) upon debt interest. This ratio measures the margin of safety of a firm with respect to its debt-interest burden. A high interest coverage ratio means that the firm can easily meet its interest burden.

Age of the firm: Age of the firm is the year of incorporation minus previous year (2015). Other quantitative factors such as earnings growth rate, consistency of earnings and dividend were not considered as they have already been factored into the Whitbeck-Kisor model. Other variables such as monsoon, GDP growth rate, interest rate and inflation are not considered since they influence the overall stock market as a whole.

The customized valuation model based on selective quantitative factors was framed by the following method:

- Quantitative variables are identified and data collected from CMIE Prowess system form 2000–2015 for the stocks included in the BSE 100 index

- Data cleaned by the following method:
- Negative PE ratios are removed from the data set since loss-making companies are ignored
- Mean and Standard Deviation are calculated for each variable data set
- Data falling outside the range (Mean +_ 3 S.D.) have been considered outliers
- Outliers have been removed

The Null Hypothesis

Ho: No significant relationship exists between price-earnings ratio (dependent variable) and the independent variables as formulated by the model.

4.8 Efficient Market Hypothesis:

4.8.1 Test of weak form of Efficient Market Hypothesis (Time pattern of security return):

A study was conducted involving the following steps:

Average monthly return of BSE Sensex and NSE Nifty calculated (Jan1996–Dec2015)

4.8.2 Test of Weak form of Efficient Market Hypothesis (Correlation Test):

The correlation tests are the tests of a linear relationship between today's returns and past returns. A regression equation is the estimated relationship between the dependent variable and independent variable and can be represented by a generalized expression: y = a + bx. The term 'a' measures the expected return, unrelated to previous returns. Since most securities give a positive return, 'a' should be positive. The term 'b' measures the relationship between the

previous return and today's return. T is calculated as the current year's return based on the BSE 100 index. T-1 is the previous year's return and so T-2 and T-3 are represented as return for previous second and third year. Conducting a regression analysis using SPSS on the returns of BSE 100 for the period of 1996–2015 is calculated.

4.8.3 Test of Semi-Strong form of Efficient Market Hypothesis: (Event Studies)

Under this test, 30 sample firms (included in the BSE Sensex) were selected from various industries during the period 1996–2015 and the dates of announcement of events (bonus declaration, dividend declaration, and stock split) are identified.

- For each firm, a particular date is identified on which there was a surprise announcement (bonus, the split of shares or a substantial increase in dividend payout etc.) which is considered as day 0 (zero).
- Period of study selected as date of surprise announcement +/- 30 days (event period)
- Return of each day for all stocks are calculated
- Now, abnormal return is calculated as Stock Return minus Index Return (S & P BSE 100)
- Individual day's abnormal return is added to compute Cumulative Abnormal Return (CAR)

Table: 4.4 (Semi-strong test of efficiency: Sample of 30 stocks)

	Name of the company	Sector	Event	Date of announcement
1	Adani Port	Port	Split : FV Rs 10 to 2	17 May 2010
2	Asian Paints	Paint	Bonus 1:2	28 May 2003
3	Axis Bank	Private Bank	Split : FV Rs 10 to 2	25 April 2014
4	Bajaj Auto	Auto-Two/Three weeler	Bonus 1:1	22 July 2010
5	Bharti Airtel	Telecom	Split : FV Rs 10 to 5	29 April 2009
6	Cipla	Pharma	Bonus 3:2	11 February 2006
7	Coal India	Coal	Interim Dividend 290%	08 January 2014
8	Dr. Reddy's Laboratiry	Pharma	Split : FV Rs 10 to 5	31 July 2001
9	Gail	Industrial Gas & Fuel	Bonus 1:2	23 June 2008
10	HDFC	Housing Finance	Bonus @ 1:1	17 October 2002
11	HDFC Bank	Private Bank	Split : FV Rs 10 to 2	18 April 2011
12	Hero Motorcorp	Auto-Two weeler	Bonus @ 1:1	04 August 1998
13	Hindustan Unilever	FMCG	Split : FV Rs 10 to 1	05 July 2000
14	ICICI Bank	Private Bank	Split : FV Rs 10 to 2	09 September 2014
15	Infosys	IT	Split : FV Rs 10 to 5	30 November 1999
16	ITC	FMCG	Dividend @ 1000%	09 June 2010
17	Larsen and Toubro	Engineering & Construction	Final Dividend 1100%	25 May 2006
18	Lupin	Pharma	Bonus @ 1:1	17 May 2006
19	Mahindra and Mahindra	Auto	Split : FV Rs 10 to 5	25 January 2010
20	Mariti Suzuki	Auto	Final Dividend 500%	27 April 2015
21	NTPC	Power	Interim Dividend 40%	17 January 2014
22	ONGC	Oil	Bonus @ 1:1	16 December 2010
23	Power Grid Corporation of India	Power	Interim Dividend 16.1%	30 January 2013
24	Reliance Industries	Refinaries	Bonus @ 1:1	13 September 1997
25	State Bank of India	Banking PSU	Split : FV Rs 10 to 1	24 September 2014
26	Sun Pharmaceuticals	Pharma	Bonus @ 2:1	09 February 2000
27	Tata Motor	Auto	Split : FV Rs 10 to 2	26 May 2011
28	Tata Steel	Steel	Bonus 1:2	07 June 2004
29	Tata Consultancy	IT	Bonus @ 1:1	20 April 2009
30	WIPRO	IT	Split : FV Rs 10 to 2	30 April 1999

Source: Compiled data

Average CAR is computed for all the sample firms and plotted against time of 61 days (-30, 0,+30) number of days.

4.8.4 Test of Strong Form of Efficient Market Hypothesis: (Insider Trading)

Some investors who own a considerable portion of the outstanding shares or are at a significantly high management level are considered insiders. If insiders trade on privileged information, then one would expect to see a insiders purchase in month before security prices increase and sell in month before security prices decline. In other words, insiders take the advantage of some events

or news which is only available to them. Hence a volume jerk will be observed on the date when the insiders act on these events or news. Therefore, the insiders are able to earn excess return than expected return, and this return must be due to the exploitation of insider information. If the market satisfies the conditions to become efficient in the strong form, even insiders fail to take advantage of the special kind of information that they possess as the market promptly absorbs them.

This test is similar to the test performed under the semi-strong test where day 0 (zero) is considered as the date on which there is a substantial increase/decrease in trading volume of shares. This test shows if the insiders can gain an excess return.

Under this test, 30 sample firms were selected from various industries (included in BSE Sensex) during the period 1996–2015 and the dates when a considerable volume of shares was bought were identified.

- For each firm, a particular date was identified on which there was a substantial increase (buy) in trading volume of shares which is considered as day 0 (zero)
- Period of study selected as dates of +/- 30 days (event period) of day 0
- Return of each day for all stocks are calculated
- Now, abnormal return is calculated as Stock Return minus Index Return (BSE 100)
- Individual day's abnormal return is added to compute the Cumulative Abnormal Return (CAR)
- Average CAR is computed for all sample firms

Table: 4.5 (Strong form test of efficiency: Sample of 30 stocks)

	BSE Sensex 30 stocks			
	Name of the company	Sector	No of shares bought	Date of purchase
1	Adani Port	Port	20,00,000.00	10 August 2011
2	Asian Paints	Paint	20,00,000.00	28 October 2005
3	Axis Bank	Private Bank	30,00,000.00	18 March 2008
4	Bajaj Auto	Auto-Two/Three weeler	10,47,500.00	24 February 2010
5	Bharti Airtel	Telecom	2,03,57,018.00	29 May 2015
6	Cipla	Pharma	8,42,810.00	31 January 2011
7	Coal India	Coal	9,51,988.00	04 November 2010
8	Dr. Reddy's Laboratiry	Pharma	15,47,170.00	15 July 2010
9	Gail	Industrial Gas & Fuel	1,97,500.00	18 September 2012
10	HDFC	Housing Finance	48,35,000.00	06 March 2009
11	HDFC Bank	Private Bank	90,00,000.00	07 November 2005
12	Hero Motorcorp	Auto-Two weeler	11,18,000.00	07 November 2014
13	Hindustan Unilever	FMCG	3,76,200.00	09 June 2010
14	ICICI Bank	Private Bank	1,26,71,478.00	07 July 2006
15	Infosys	IT	1,55,56,631.00	08 December 2014
16	ITC	FMCG	8,66,850.00	24 January 2007
17	Larsen and Toubro	Engineering & Construction	40,13,534.00	06 November 2009
18	Lupin	Pharma	83,46,296.00	29 May 2015
19	Mahindra and Mahindra	Auto	28,90,000.00	17 July 2014
20	Mariti Suzuki	Auto	34,23,695.00	30 November 2015
21	NTPC	Power	40,820.00	13 January 2010
22	ONGC	Oil	1,25,195.00	14 January 2010
23	Power Grid Corporation of India	Power	2,46,89,593.00	25 November 2010
24	Reliance Industries	Refinaries	2,04,00,000.00	28 May 2013
25	State Bank of India	Banking PSU	32,33,163.00	25 March 2008
26	Sun Pharmaceuticals	Pharma	2,01,61,290.00	21 April 2015
27	Tata Motor	Auto	28,64,843.00	08 December 2010
28	Tata Steel	Steel	30,25,000.00	13 April 2007
29	Tata Consultancy	IT	1,03,21,324.00	06 May 2009
30	WIPRO	IT	3,71,50,000.00	15 March 2013

Source: Compiled data

Chapter 5

DATA ANALYSIS AND FINDINGS

Chapter 5

Data Analysis and Findings

5.1 Test of Whitbeck-Kisor model:

Table 5.1

Result of Whitbeck-Kisor model									
Year	Constant term	Percentage growth of EPS	Std. Deviation of EPS	Dividend Pay out	F Value	R Squared	Std. error of estimate	Degrees of freedom	Significance
2000-2015	20.399	-0.035	-0.128	1.146	16.116	0.047	15.11662	988	0.000
2000-2009	16.696	-0.021	-0.015	1.023	5.137	0.027	13.09036	550	0.002
2001-2010	17.748	-0.026	-0.045	1.005	6.384	0.031	13.08248	595	0.000
2002-2011	19.481	-0.039	-0.100	0.968	9.491	0.044	13.12235	622	0.000
2003-2012	20.620	-0.036	-0.144	0.895	10.121	0.045	13.33991	646	0.000
2004-2013	22.515	-0.037	-0.206	0.809	11.008	0.047	14.57980	669	0.000
2005-2014	23.206	-0.037	-0.197	0.863	10.955	0.046	15.15287	683	0.000
2006-2015	24.534	-0.040	-0.236	0.848	13.287	0.055	16.00336	688	0.000

Source: Compiled data

- The coefficient of determination R-squared is the measure of 'goodness of fit' which is interpreted as the percentage of variation in the dependent variable explained by the independent variables. Poor values of R-squared reveals that the model is not validated in the Indian stock market not only during 2000–2015 but also during cross-sectional periods of ten years, each during the same time frame.
- The model established a negative relationship of price-earnings ratio with growth of earnings per share and Standard Deviation of earnings per share, but a positive relationship with dividend payout.
- Since there is scope of multicollinearity between independent variables, a distorted value of the standard error of estimate may result.

- This leads to problem in conducting t-test for statistical significance of the parameters. There is scope that we may incorrectly conclude that a variable is not statistically significant when it is statistically significant (Type II error).
- Here the F statistic has been considered where degrees of freedom are indicated by two numbers, the numbers of the slope coefficient (independent variables =3) and the other as the sample size - number of slope coefficient -1 (infinity in this case).
- The critical value of F at 5% level of significance is 2.60
- Hence we conclude the following result:

Table 5.2 Significance Test

Result of Whitbeck-Kisor model								
Year	Constant term	Percentage growth of EPS	Std. Deviation of EPS	Dividend Pay out	F Value	R Squared	Critical value of F at 5% level of significance	Decision
2000-2015	20.399	-0.035	-0.128	1.146	16.116	0.047	2.6	Reject
2000-2009	16.696	-0.021	-0.015	1.023	5.137	0.027	2.6	Reject
2001-2010	17.748	-0.026	-0.045	1.005	6.384	0.031	2.6	Reject
2002-2011	19.481	-0.039	-0.100	0.968	9.491	0.044	2.6	Reject
2003-2012	20.620	-0.036	-0.144	0.895	10.121	0.045	2.6	Reject
2004-2013	22.515	-0.037	-0.206	0.809	11.008	0.047	2.6	Reject
2005-2014	23.206	-0.037	-0.197	0.863	10.955	0.046	2.6	Reject
2006-2015	24.534	-0.040	-0.236	0.848	13.287	0.055	2.6	Reject

Source: Compiled data

Findings: Results of Whitbeck-KisorTest for the year 2000–2015

Table 5.3

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.216[a]	.047	.044	15.11662

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11047.879	3	3682.626	16.116	.000[a]
	Residual	225084.475	985	228.512		
	Total	236132.354	988			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.399	.783		26.048	.000
	g_eps	-.035	.010	-.108	-3.460	.001
	sd_eps	-.128	.043	-.093	-2.956	.003
	div_pay_out	1.146	.202	.178	5.667	.000

Source: Compiled data

g_eps :PercentageGrowth of EPS

sd_eps : Standard Deviation of EPS

div_pay_out: Dividend Payout

The results of the othertests 2000-2009 to 2006-2015 given in ANNEXURE V

Since the observed value of F exceeds the critical value at 95% level of significance, we reject the null hypothesis. However,the poor R squared value reveals that Whitbeck-Kisor model failed to produce a good result when applied to the 100 stocks traded in the market over a longer period of time.

5.2 Test of Capital Asset Pricing Model

The values of *r* plotted for the above data during 1996–2015 are as follows:

(Rank distribution of beta and return shown in Annexure V)

Figure 5.4

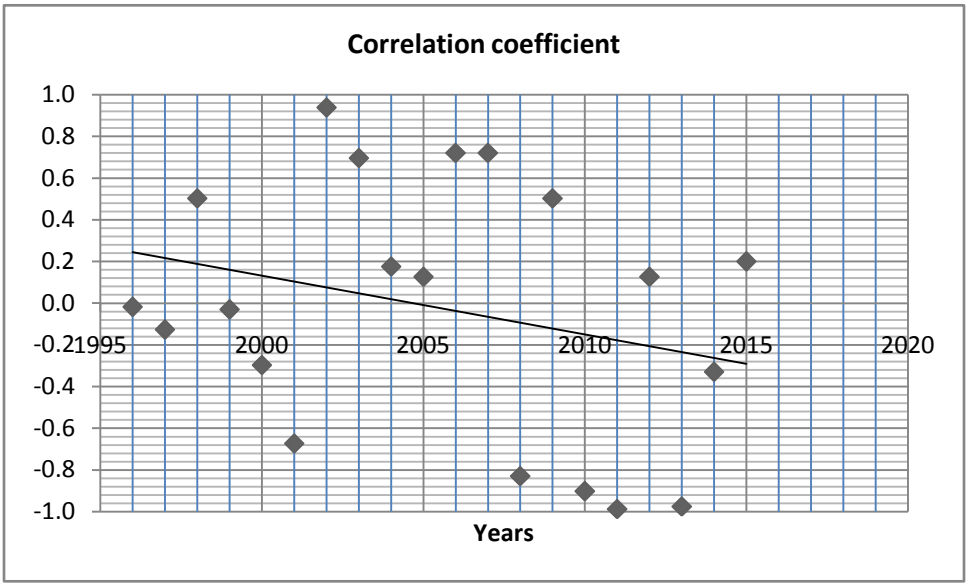
Correlation coefficient test (1996–2015)

Years	r
1996	-0.018180
1997	-0.127270
1998	0.503030
1999	-0.030300
2000	-0.296970
2001	-0.672730
2002	**0.939394**
2003	**0.696970**
2004	0.175758
2005	0.127273
2006	**0.721212**
2007	**0.721212**
2008	-0.830300
2009	0.503030
2010	-0.903030
2011	-0.987880
2012	0.127273
2013	-0.975960
2014	-0.330000
2015	0.200000

Source: Compiled data

Figure 5.1

Correlation co-efficient test (1996-2015)



Source: Compiled data

- Since risk and return for stocks should prevail a positive relationship and the value of r should be close to +1
- Except for the years 2002, 2003 and 2006, 2007; correlation coefficient (*r)* did not show the desired relationship during the time frame of 1996–2015
- The plotted *r* has produced a downward trend line which signifies the market did not validate the CAPM theory during the time frame of testing

5.3 Stock Valuation Model:

- The data for 2000–2015 regressed using SPSS stepwise method and the following result is obtained:

Table 5.5 (Valuation Model)

2000-2015	CONSTANT	AGE	DE	BETA	R-SQUARE
PE	30.090	-.159	-.112	5.024	.092

Source: Compiled data

The result shows that the Indian capital market discounted the three variables of age (negative relationship), the debt-equity ratio (negative relationship) and beta (strong positive relationship) explaining the price-earnings ratio for the period of 2000–2015 with a very poor R-squared value of 9.6%. The equation can be written as:

Price-earnings ratio = 30.09-0.159 (Age) -0.112 (debt equity ratio) + 5.024 (beta)

Table 5.6: ANOVA (Valuation Model)

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17930.804	1	17930.804	42.518	.000[a]
	Residual	339486.821	805	421.723		
	Total	357417.626	806			
2	Regression	25421.445	2	12710.722	30.782	.000[b]
	Residual	331996.181	804	412.931		
	Total	357417.626	806			
3	Regression	30760.263	3	10253.421	25.205	.000[c]
	Residual	326657.363	803	406.796		
	Total	357417.626	806			
4	Regression	32772.490	4	8193.123	20.240	.000[d]
	Residual	324645.135	802	404.794		
	Total	357417.626	806			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.277	1.527		20.486	.000
	age	-.162	.025	-.224	-6.521	.000
2	(Constant)	32.135	1.524		21.084	.000
	age	-.152	.025	-.211	-6.176	.000
	ncf	.000	.000	-.145	-4.259	.000
3	(Constant)	34.468	1.644		20.964	.000
	age	-.160	.025	-.222	-6.526	.000
	ncf	.000	.000	-.146	-4.304	.000
	de	-.096	.026	-.123	-3.623	.000
4	(Constant)	30.090	2.559		11.761	.000
	age	-.159	.024	-.220	-6.481	.000
	ncf	.000	.000	-.155	-4.548	.000
	de	-.112	.027	-.143	-4.081	.000
	beta	5.024	2.254	.078	2.230	.026

Source: Compiled data

Therefore, as per model, we can conclude that an investor who is looking for a stock with the lower price-earnings ratio (with higher potential for price rise) will search for an older company with high leverage and which is traded less sensitively in the market (low beta).

Table: 5.7 (Significance Test: F Value)

2000-2015	R Square	Degrees of Freedom	F value
	0.092	806	20.24

Source: Compiled data

- Since there is scope of multicollinearity between the independent variables, a distorted value of the standard error of the estimate may result.

- This leads to a problem in conducting t-test for statistical significance of the parameters. There is a scope that we may incorrectly conclude that a variableis not statistically significant when it is statistically significant (Type II error).
- Here the F statistic has been considered where the degrees of freedom are indicated by two numbers, the numbers of the slope coefficient (independent variables =3) and the other as the sample size - number of slope coefficient -1 (infinity in this case).
- The low p-value (significance as referred in the table) tells us that there is less than 0.1% chance (except during the time of 2000–2009) that an F ratio is large would happen even if the null hypothesis were true.
- The critical value of F at 5% level of significance is 2.60

Hence we conclude that since the observed value is more than the tabulated value, we reject the null hypothesis that there is a significant relationship between the price-earnings ratio (dependent variable) and the independent variables as formulated by the model but with low R squared value. The low R squared value signifies the low explanatory power of the model.

5.4 Test of valuation model:

Table: 5.8

Year	Co Name	Industry	Actual PE	PE as per Model	Variation (%)
2000	Bosch	Engineering	20.48	21.60	5.47
2001	Zee Entertainment	Entertainment	36.20	30.24	-16.46
2002	Britania Industries	FMCG	25.60	15.85	-38.10
2003	Cipla	Pharmaceuticals	17.35	20.90	20.48
2004	HCL Technologies	IT	27.14	34.97	28.86
2005	Mahindra & Mahindra	Automobiles	11.70	22.82	95.03
2006	Asian paints	Paints	33.62	20.32	-39.55
2007	Hindustan Unilever	FMCG	31.09	20.12	-35.28
2008	Reliance Capital	Finance	29.08	28.35	-2.50
2009	Bharat Petroleum Corp Ltd	Petroleum	18.66	17.68	-5.25
2010	Tata Steel	Steel	11.17	16.76	50.02
2011	Bank of India	Banking PSU	10.80	18.88	74.81
2012	DLF	Housing Infra	33.38	24.74	-25.88
2013	Bharti Airtel	Telecom	21.75	29.28	34.61
2014	United Phosphorus Ltd	Chemicals	22.02	29.33	33.21
2015	Yes Bank	Private Banking	17.01	30.29	78.07

Source: Compiled data

The model has been tested with the historical data of 16 companies selected at random across different industries for each year of 2000–2015, during which the model has been framed and the tabulated PE has been compared with the actual PE ratio. The result from the above table can be summarized as:

- The difference of the tabulated PE and actual PE shows a wide variation from -39.55% to +95.03%
- Obtaining a price-earnings ratio within a tolerance of 10% results a probability of only 3/16
- Low probability coupled with low R-squared value signifies lower acceptability of the model

5.5 Test of Efficient Market Hypothesis:

5.5.1 Test of Weak form of Efficient Market Hypothesis (Time pattern of security return):

A study conducted involving the following steps:

Average monthly return of BSE Sensex and NSE Nifty calculated (Jan1996–Dec2015) and the result is given in the following table:

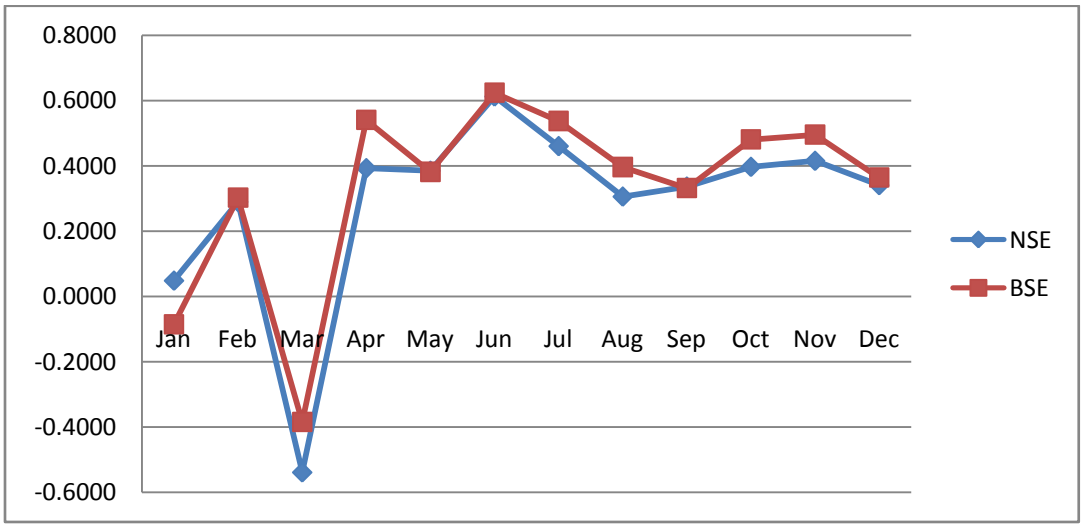
Table: 5.9 (Monthly return of BSE 100)

	Nifty	BSE 100
Jan	0.3845	0.3810
Feb	0.2890	0.3020
Mar	-0.5390	-0.3845
Apr	0.3925	0.5405
May	0.3845	0.3810
Jun	0.6120	0.6235
July	0.4600	0.5370
Aug	0.3055	0.3960
Sep	0.3360	0.3315
Oct	0.3965	0.4805
Nov	0.4150	0.4950
Dec	0.3405	0.3640

Source: Compiled data

The graphical representation of the above data is

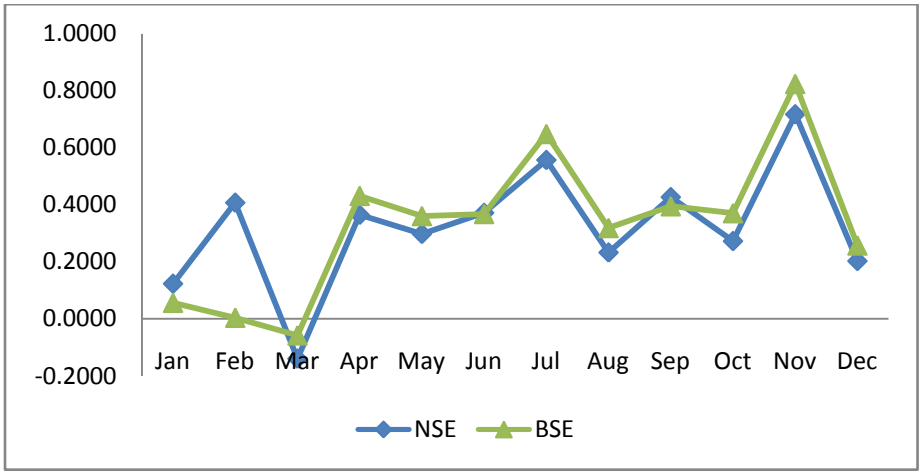
Fig: 5.2 (Graph-Monthly return 1996-2015)



Source: Compiled data

A graphical representation covering a wider range of time (from 1991–2015) gives an even more transparent picture:

Fig: 5.3 (Graph-Monthly return 1991-2015)



Source: Compiled data

- The correlation coefficient (between the returns of BSE and NSE indexces)is found to be 0.92291
- Lowest monthly return found in March
- There is a negative return in March followed by a positive return in April
- Reason could be year-end effect and book closure for most corporate houses
- Second highest monthly return observed in July
- Reason could be declaration of yearly results by most corporates and the effect of the monsoon
- Highest return generated in November
- This could be the Diwali effect, i.e. the Sambat of the broker community

A number of studies have reported time pattern in security returns. Returns follow a wave pattern which are systematically higher or lower depending on the time of the day, the day of the week , and the month of the year. It is hard to draw any conclusion from this literature. One explanation is that with many researchers examining the same data set, patterns will be found and that these patterns are simply random. If this is true, then evidence from other markets and other time periods should not find similar patterns. A second possible explanation is that these patterns are formed by the structure of the market and demand and supply of securities traded in the market. The third possible answer is that markets are inefficient because one would expect that the pattern would disappear as investors tried to exploit them. Until they are fully understood, the best advice is that in most cases because of transaction costs the return differences are not large enough to develop a trading strategy to take advantage of; if one is trading anyway, however, one might time the trade to try to exploit the pattern.

It is possible to earn a positive return by selling prior to March and buying before July or November irrespective of the market condition. This contradicts with the weak form of efficiency, which states that the movement of the market is random and should not show any pattern. In an efficient market, we should not expect a seasonal pattern.

5.5.2 Test of Weak Form of Efficient Market Hypothesis (Correlation Test):

Correlation tests are tests of a linear relationship between today's returns and past returns. A regression is the estimated relationship between the dependent variable and independent variable and can be represented by a generalized expression:

Table: 5.10 (Correlation test)

Year	T	T-1	T-2	T-3
1996	-4.77	-23.48	11.23	35.08
1997	16.04	-4.77	-23.48	11.23
1998	-14.31	16.04	-4.77	-23.48
1999	92.59	-14.31	16.04	-4.77
2000	-25.68	92.59	-14.31	16.04
2001	-23.75	-25.68	92.59	-14.31
2002	6.89	-23.75	-25.68	92.59
2003	84.34	6.89	-23.75	-25.68
2004	15.88	84.34	6.89	-23.75
2005	37.84	15.88	84.34	6.89
2006	40.65	37.84	15.88	84.34
2007	59.35	40.65	37.84	15.88
2008	-55.41	59.35	40.65	37.84
2009	83.80	-55.41	59.35	40.65
2010	15.87	83.80	-55.41	59.35
2011	-26.07	15.87	83.80	-55.41
2012	29.45	-26.07	15.87	83.80
2013	5.47	29.45	-26.07	15.87
2014	31.93	5.47	29.45	-26.07
2015	-3.22	31.93	5.47	29.45

Source: Compiled data

The Null Hypothesis is:

Ho: No significant relationship exists between current year's return on S & P BSE 100 Index (T) (dependent variable) and the previous three year's return, i.e. T-1, T-2 and T-3 (independent variables)

Table: 5.11 (Result of correlation test)

Year	Constant term	T-1	T-2	T-3	F Value	R Squared	Crtical value of F at 5% level of significance	Degrees of freedom
1996-2015	30.143	-0.417	-0.213	-0.062	1.004	0.158	3.24	3,16

Source: Compiled data

Table: 5.12 (ANOVA - Correlation test)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.398[a]	.158	.001	40.06884

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4833.559	3	1611.186	1.004	.417[a]
	Residual	25688.190	16	1605.512		
	Total	30521.749	19			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	30.143	13.003		2.318	.034
	T1	-.417	.243	-.426	-1.713	.106
	T2	-.213	.257	-.216	-.827	.420
	T3	-.062	.243	-.063	-.255	.802

Source: Compiled data

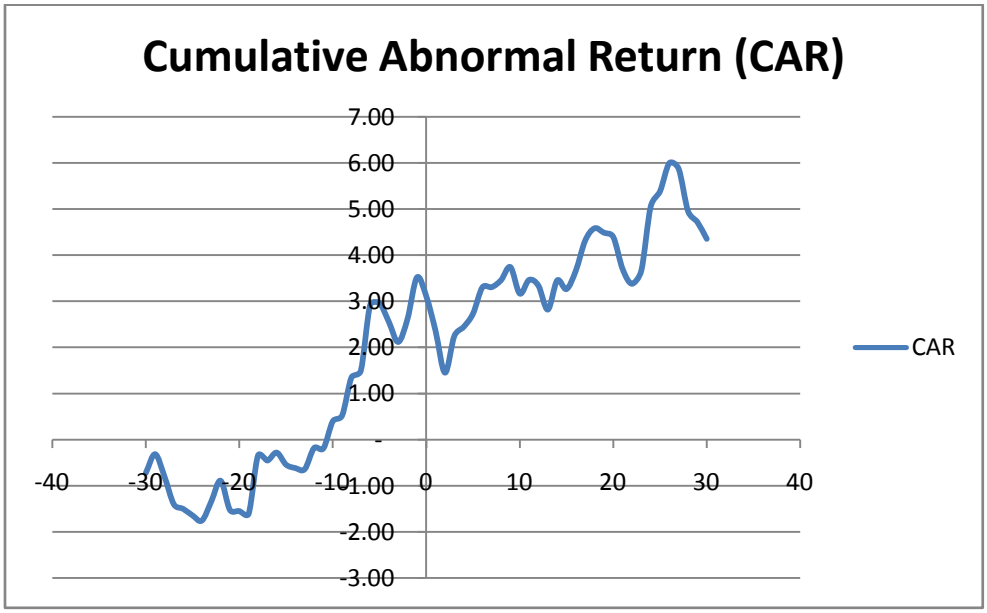
The result shows a positive constant term and negative coefficients for all the three dependent variables with a very low R squared value. The critical value of F at (3, 16)

degrees of freedom is 3.24 at the 5% level of significance. Since the calculated value of F is less than the critical value, we will accept the null hypothesis and conclude that no significant relationship exists between current year's return on BSE 100 index (T) (dependent variable) and the previous three year's return, i.e. T-1, T-2 and T-3 (independent variables). However, the low r-square value signifies a very low explanatory power of the relationship.

5.5.3 Test of Semi-Strong Form of Efficient Market Hypothesis: Event Studies

Under this test, 30 sample firms (included in the BSE Sensex) were selected from various industries during 1996–2015 and the dates of announcement of events (bonus declaration, dividend declaration and stock split) were identified. Average CAR was computed for all the sample firms and plotted against time of 61 days (-30, 0, +30) number of days which is represented by the following graph (The summary of the calculation of CAR shown in Annexure VI):

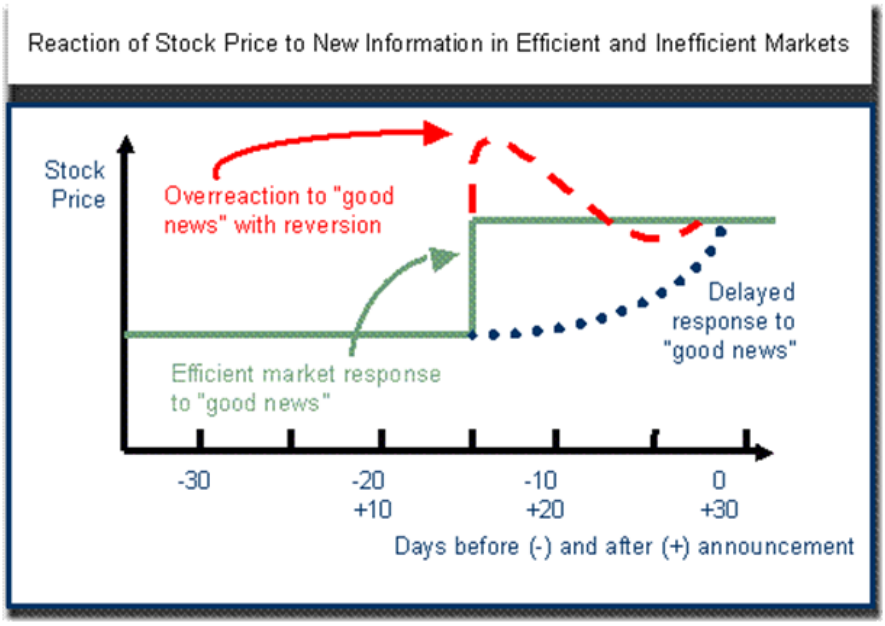
Fig: 5.4 (Semi-strong form of efficiency test)



Source: Compiled data

The CAR diagram of event studies in an efficient market is represented by the following figure:

Fig: 5.5Cumulative abnormal return of semi-strong efficiency test-(Efficient market)



Source:https://www.google.co.in/search?q=semi+strong+of+efficient+market+hypothesis+graph&dcr=0&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjLsbGu84bWAhWLQo8KHUj_Dq0Q_AUICigB&biw=1366&bih=638#imgrc=zIYCs81OezZ5TM

To satisfy the condition for a semi-strong form of efficiency, the abnormal return can be observed on the date of announcement but not on other days. In our experiment, abnormal positive returns were observed on the days from -30 till +30.

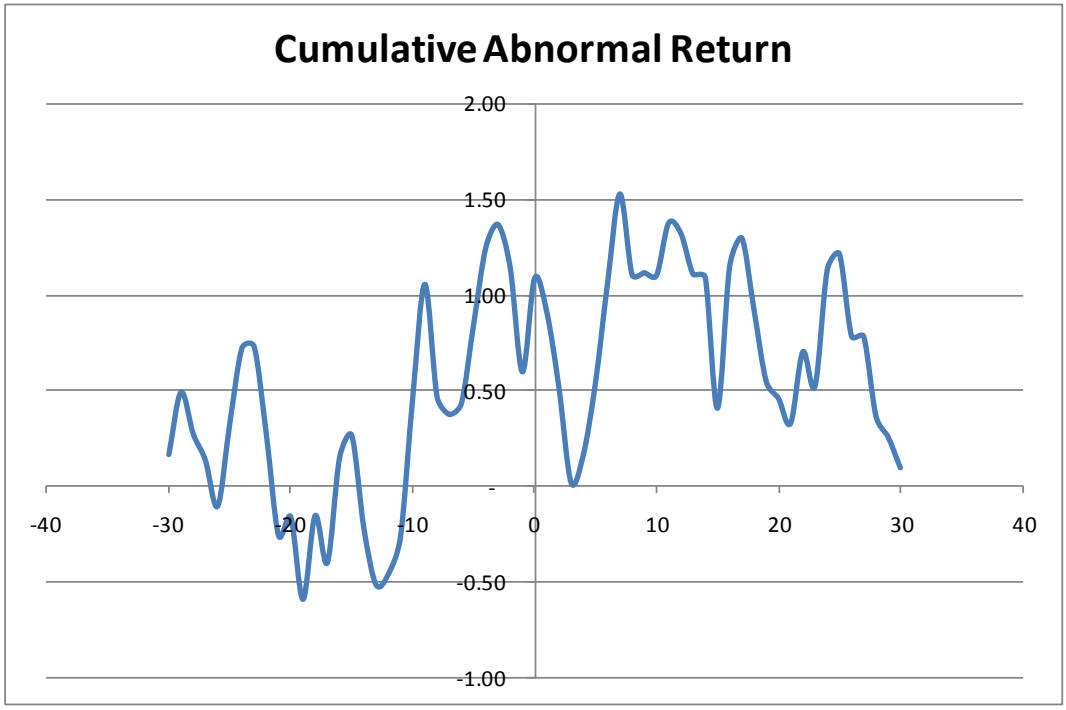
The graph clearly shows that the Indian capital market fails to satisfy the test of semi-strong form of efficiency. The reasons are:

- Change of CAR at the time of announcement not instantaneous
- Positive movement in CAR observed prior to day zero

5.5.4 Test of Strong Form of Efficient Market Hypothesis: Insider Trading

The pattern of CAR obtained in the test is given as follows (The summary of the calculation shown in Annexure VI):

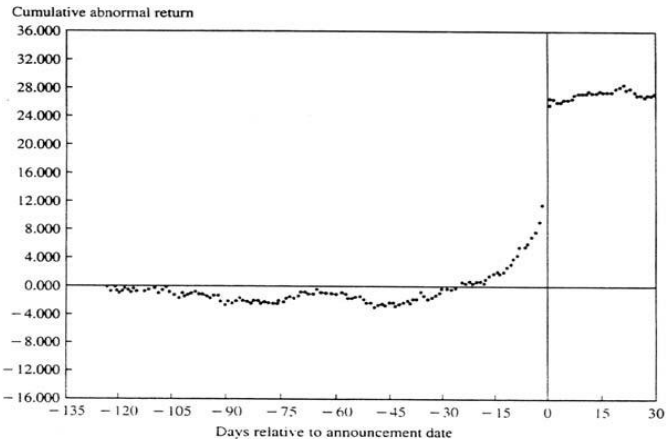
Fig: 5.6 (Cumulative abnormal return of strong form of efficiency test)



Source: Compiled data

The pattern of CAR which signifies that the insiders are not able to take advantage of privileged information and exploit the situation which supports the strong form of market efficiency is given by the following fig:

Fig: 5.7 (Strong form of efficiency test-Efficient market)



Source:https://www.google.co.in/search?q=cumulative+abnormal+return+graph&dcr=0&source=lnms&tbm=isch&sa=X&ved=0ahUKEwidp6ji9YbWAhWBto8KHQ1UAIIQ_AUICigB&biw=1366&bih=638#imgrc=U6NQWdo_BOncLM

A study conducted on the movement of the share price of 30 selected firms around day 0 and CAR calculated and plotted. The graph fails to generate a pattern which can show that the Indian capital market satisfies strong form of efficiency. The graph clearly shows that an upward Cumulative Abnormal Return (CAR) appeared 20 days prior to the date when a large transaction (buy) took place. The result signifies that insiders could take advantage of the upward price movement of stocks and can make excess return.

5.6 Discussions:

Indian capital markets have witnessed multi-fold reforms over the last two decades. The opening up of markets for FIIs, foreign and private mutual funds, the introduction of derivatives and electronic trading, replacement of archaic CCI with SEBI etc. have all played a significant role in boosting stock market volumes and efficiency by and large. This research of Whitbeck- Kisor

Model, CAPM and the customized stock valuation model fails to generate conclusive evidence in India within the referred time frame. The issue may not be of the validity of the models per se or their customization, but that of market efficiency. Till such market efficiency is enhanced, valuation studies will be a futile exercise in most emerging markets, including India.

Now, the reasons that could be responsible for non-validating the valuation models are:

- Investors' behavior or preferences change over time
- Market incorrectly discounts rapid changes of firms and industry variables
- Firm effects due to persistent influences that are not captured in the model
- Assumptions (selection of the variables) of the model are incorrect
- Industry and economy specific factors affect the model adversely
- Multiples are not normally distributed and can show incorrect result, while using standard regression technique
- In multiple regressions, independent variables are themselves supposed to be independent of each other. The independent variables that we have used explain valuation multiples, cash flow potential or payout ratio, expected growth and risk. Across the sector and over the market, it is quite clear that high-growth companies will tend to be risky and have low payouts. This correlation across independent variables creates so-called multi-co linearity, which can undercut the explanatory power of the regression.
- The Indian stock market is not 'efficient'

With the rise of computerized systems to analyze the stock market investments, traders and investors are increasingly automated on the basis of sophisticated mathematical and analytical methods. Some computers can quickly process all available information, and even translate such analysis into an immediate trade execution. Despite the sophisticated use of modern technology,

most investment decisions are subject to human error, even at the institutional level. Success in stock market investing is based mostly on human skill and anticipation. People are continuously searching for better methods for achieving better returns than the market.

It is practically very difficult to attain perfect efficiency for any market, but it is possible for a market to operate with greater efficiency complying with the following conditions:

- Universal access to high-speed and advanced pricing analysis
- Universally accepted analysis system of pricing stocks
- An absolute absence of human emotions in investment decision-making
- Willingness of all investors to accept that their returns or losses will be exactly identical to other market participants
- Introduction of sophisticated computerized system in exchanges which can analyze new information and implement into stock prices instantaneously
- Absence of speculation, and decisions guided by human emotions without being backed by fundamental analysis.

There are generally two different types of investors in the stock market. The first typeisthe common people who generally are small investors. They are mostly guided by speculation and emotions. The other group constitutes of investment through institutional investors i.e. mutual funds, who generally make investment decisions by adequate research based on fundamentals and technical analysis. India is among the countries with lowest mutual fund investment to GDP ratio in the world at 7%. This ratio compares to 91% in USA and 51% in UK in 2015. In India, mutual fund investments accounted for only 3.4% of the total financial investments made by individual investors including HNI and retail as per reports published by Earnst and Young and Café Mutual. Since the first part poses a considerable influence in

the market, the stock market fails to act ‘rationally’. The word ‘rationally’ means that market prices of the stocks should coincide with the intrinsic values of stocks. If investments made by small investors can be channelized through institutional investors, for example, through mutual funds, the market will act more rationally, which will increase the ‘efficiency’ of the market.

- The Indian stock market is still influenced to a great extent by FII investments and their ‘hot money’. It poses a risk in investing money as their sudden pulling out of money leads to crashes in the market. It is considered to have the greatest influence on Indian stock market and their role needs to be discussed in detail. However, more domestic funds are required to nullify the effect of FII investments in the form of instructional investment to make the Indian stock market more ‘efficient’ and ‘rational’.

Chapter 6

CONCLUSIONS

Chapter 6

6.1 Conclusions

The inferences from the research can be summed up as follows:

Test of a price-earnings (Whitbeck-Kisor) valuation model in context of the Indian stock market

- The model established a negative relationship between price-earnings ratio with growth of earnings per share and std. deviation of earnings per share, but a positive relationship with dividend payout.
- Poor values of R-squared reveals that the model is not validated in the Indian stock market not only during 2000–2015 but also during cross-sectional periods of ten years, each during the same time frame.

Test of Capital Asset Pricing Model (CAPM) in context of the Indian stock market

- Except for the years 2002–2003 and 2006–2007; correlation coefficient between systematic risk and return did not show the desired relationship during the time frame of 1996–2015.

To develop and test a customized valuation model

- The result shows that the Indian capital market discounted the three variables:age (negative relationship), the debt-equity ratio (negative relationship) and beta (strong positive relationship), explaining the price-earnings ratio for the period of 2000–2015 with a very poor R-squared value of 9.6%.

Test of weak form of efficiency of stock market

- Time pattern of security return: The study clearly shows that it is possible to earn a positive return by buying in March and selling in July or November, irrespective of the market condition. This contradicts with the weak form of efficiency, which states the movement of the market is random and should not follow any pattern. In an efficient market, no investor can earn an extra return analyzing the historical seasonal pattern of stock returns.
- Correlation Test: The result shows a positive constant term and negative coefficients for all the three dependent variables with a very low R squared value. The research also concluded that there is a poor relationship between current year's return on BSE 100 index (T) (dependent variable) and previous three year's return, i.e. T-1, T-2 and T-3 (independent variables).

Test of semi-strong form of efficiency of stock market

- To satisfy the condition for semi-strong form of efficiency, abnormal return should be observed on the date of announcement but not on other days. In our experiment, abnormal positive returns were observed on the days from -30 till +30. The study clearly shows that the Indian capital market fails to satisfy the test of semi-strong form of efficiency and showed existence of insider trading.

Test of strong form of efficiency of stock market

- A Study conducted on the movement of the share price of the 30 selected firms around day 0 and Cumulative Abnormal Return (CAR) calculated and plotted. The graph fails to

generate a pattern which can show that the Indian capital market satisfy the strong form of efficiency.

6.2 Limitations of the study:

The research has the following limitations:

- The Whitbeck-Kisor model was tested considering the projected data, whereas the model tested in this research is based on historical data.
- In testing CAPM theory, Beta is calculated on daily return of each stock for every year instead of multiple years covering different stages of the market
- In the stock valuation model, qualitative factors are not considered which might have influenced the price-earnings of stocks
- Only two tests are considered verifying weak form of efficiency and one test each considered for semi-strong and strong form
- The strong form test of efficiency is conducted for 30 stocks
- Since the composition of the BSE S & P 100 index changed during the perod of study, the study conducted considering the stocks which remined constant during this period.

6.3 Scope for future research:

In this research, though the test of Whitbeck-Kisor model failed in the broader market, the same variables may not be responsible for the price-earnings ratio of the market as a whole, but some other sector-specific variables justify the price-earnings ratio of that particular industry. This leaves a huge area for further scope of study. Firstly, instead of considering the broader market,

the multiples could be defined consistently within the industry and among industries. Secondly, the price-earnings ratio of every industry could be analyzed and compared to find the basic nature of the multiplier. Thirdly, fundamental variables responsible for the movement of price earnings-ratio over time for each industry can be analyzed and the effects of the changes of the variables to that of the multipliers can be looked into. Moreover, the conclusion of this research ended with a question mark. Do valuation models work in an inefficient market? The research tried to shed some light on this darker area and raises the question of the relationship between valuation and the efficient market. The efficient market considers the speed of discounting new information, but ignores accuracy of the price after impounding of the new information. This leaves a larger scope of future research considering valuation and efficiency together, which can reconsider the very basic definition of 'efficiency' of the stock market. Moreover, other efficiency tests, i.e. weak form, semi-strong and strong tests can be conducted to judge the efficiency of the Indian stock market.

ANNEXURE I

Major milestones in the history of Indian stock market before and after liberalization : Pre Liberalization

July 9, 1875: Native brokers form the Native Share and Stock Brokers' Association in Bombay. Membership fee is Re 1. The association had 318 members.

1899: Bombay Stock Exchange (BSE) acquires own premises

1921: Clearing houses are established for settlement of trades as volume increases

1923: K. R. P.Shroff becomes the honorary president of BSE

1925: The Bombay Securities Contracts Control Act (BSCCA) comes into force

Dec 1, 1939: Stock exchange building acquired

1943: Forward trading banned till 1946, only ready-to-deliver and hand delivery contracts permitted.

1956: Securities Contracts (Regulation) Act drafted on the lines of BSCCA comes into force

1957: BSE becomes the first exchange in India to get permanent recognition

April1, 1966: K. R.P.Shroff retires and Phiroze J Jeejeeboy becomes new Chairman

June29, 1969: Morarji Desai bans forward trading

1973: Construction of P J Towers started

Jan 2, 1986: BSE Sensex launched as the first stock market index with 1978–79 as the base year

November 1987: SBI Mutual Fund launches Magnum Regular Income Scheme

April 1988: Securities and Exchange Board of India (SEBI) established

POST LIBERALIZATION :

January 1992: SEBI given statutory power

May 1992: Harshad Mehta securities scam breaks

May 27, 1992: Reliance becomes the first company to make a GDR issue

May 30, 1992: The Capital Issues (Control) Act, 1947 is repealed

September 1992: Foreign Institutional Investors are permitted to invest in the Indian securities market

November 1992: Finance Minister Dr. Manmohan Singh inaugurates Over-the- Counter Exchange of India (OTCEI)

October 30, 1993: The first private sector mutual fund, Kothari Pioneer Mutual Fund, begins operation

1993: SEBI bans *badla* trading on BSE

June 1994: NSE commences operations in wholesale debt market segment

November 1994: The capital market segment of NSE goes on stream; Trading on screen startedfor the first time in India

March 1995: BSE Online Trading System (BOLT) replaces open outcry system

April 1995: The National Securities Clearing Corporation Limited, India's first clearing corporation,started

October 1995: NSE overtakes BSE as the largest stock exchange in terms of volume of trading

April 1996: Nifty is born. The National Securities Clearing Corporation Limited commences Operations II

November 1996: The National Securities Depository Limited iscreated

February 1997: SEBI releases norms for takeovers and acquisitions

May 1997: BSE introduces screen-based trading

November 1998: SEBI recognizes Interconnected Stock Exchange founded by 15 regional stock exchanges. This exchange starts functioning in February 1999

March 11, 1999: Infosys Technologies is the first company to be listed on NASDAQ through public offering of American Depository Receipt

March 22, 1999: Central Depository Services (India) promoted by BSE commences operations

September 1999: ICICI becomes the first Indian company to be listed on the New York Stock Exchange (NYSE)

October 11, 1999: For the first time in BSE's history, the Sensex closes above the 5000 mark at 5031.78

January 2000: BSE creates a 'Z' category of scripts in addition to A, B1 and B2, comprising scripts that breached or failed to comply with the listing agreement

February 2000: Internet trading commenced on NSE. On February 14 2000, BSE Sensex hit all-time high of 6150. On February 21 2000, NSE records peak market capitalization of Rs 11, 94,282 crores

June 9, 2000: BSE and NSE introduces derivative trading in the form of index future

January 22, 2001: Borrowing and Lending Securities Scheme (BLESS) launched on BSE to promote securities lending and borrowing activities

March 2001: Ketan Parekh scam breaks

May 2001: BSE advises compulsory DEMAT for B2 scripts

June 1, 2001: Index options starts trading on BSE

July 9, 2001: A SEBI directive bans carry forward. All major securities moved to rolling settlement, options of individual scripts start trading on BSE

November 9, 2001: BSE and NSE launch futures in individual stocks

August 19, 2005: BSE becomes a corporate entity

October 1, 2008: Currency Derivative introduced

October 4, 2010: SENSEX Futures launched

November 12, 2010: Volatility Index commences

November 28, 2013: Currency Derivative (BSE CDX) launched

January 28, 2014: Interest Rate Futures launched

Source: Business Today, January 20, 2002 p.62-63.

ANNEXURE II

Mail sent to Mutual Fund houses asking for feedback

Dear Sir,

This is to inform you that I am a professional banker presently pursuing PhD from ICFAI University, Ranchi under guidance of Dr. Subir Sen, Dean and Head of the Department, Supreme Knowledge Foundation Group of Institutions, Kolkata and Dr. B. M. Singh, Dean Faculty of Management Studies, ICFAI University, Jharkhand, Ranchi.

The topic of my research is:

"A STUDY OF EFFICIENT MARKET HYPOTHESIS AND ITS IMPACT ON VALUATION MODELS IN INDIAN STOCK MARKET, WITH SPECIFIC REFERENCE TO POST LIBERALIZATION PERIOD"

For the research purpose, I need feedback from fund managers who are working in Indian stock markets on the Price Earnings Valuation model.

I will be grateful if you to go through the feedback form and give your views to the following email address. I would also request you to forward this mail and circulate it among other fund managers and analysts. If you need any further clarification, please feel free to contact me at any time.

Mr. SouravMazumder
CAIIB, CFA (ICFAI), FRM
souravmazumder@rediffmail.com
Contact No: 090518 21438
094334 43292

Feedback Form

A STUDY OF EFFICIENT MARKET HYPOTHESIS AND ITS IMPACT ON VALUATION MODELS IN INDIAN STOCK MARKET, WITH SPECIFIC REFERENCE TO POST LIBERALIZATION PERIOD

Studies on asset valuation on pricing have long been a mainstay in research on finance. Valuation is a process of estimating the worth of an asset. Valuations are important not only from the point of view of investment analysis, but also include decisions on merger and acquisition, capital budgeting, financial reporting, determination of tax liability, litigation and due diligence, among others. Researchers have worked on various genres of valuation models: however, despite over five decades of extensive research in this area, research findings remain inconclusive.

A valuation model is a mechanism that uses a series of historical data to arrive at the intrinsic value of a financial asset. Valuation of stocks is done using various types of models. The first generation models include 'absolute value' models which attempt to determine the present value of stock using future benefits. Absolute valuation models attempt to find the intrinsic value of a stock based only on fundamentals. While absolute value models are widely accepted in the academic fraternity of its rigor, they are seldom used by practitioners (Bing, 1971). Researchers value stocks by applying a close surrogate of earnings multiples (usually price to earnings, or simple PE multiple).The approaches to the establishment of the PE multiple covers a wide range. Most researchers use historical PE stocks or the historical PE multiple of a stock or a panel data across a particular industry or a market proxy (usually an index). Another distinctive approach is to list and discuss a set of factors that are perceived to affect PE multiple. Cross-sectional regression analysis isused to define the weights on a set of hypothesized determinants of a stock price over a period of time.

One of the earliest empirical studies to use this approach was (Whitbeck- Kisor, 1963) based on the US stock market. According to this model, the PE multiple of a stock was found to be the functions of its earnings growth, dividend payout and standard deviation of the earnings growth.

The relationship was defined as PE multiple =8.2 + 1.5 (projected earnings growth rate) + 6.7 (dividend payout) – 0.20 (variation in earnings).

This represents an equation which can be used to arrive at the theoretical PE multiple for any stock by substituting the values of the independent variable forecasts. Itis very important to note that the model worked for the stock market as a whole (applicable for any stock listed in the market) justifying the market value and not for particular industry.

The researcher initially attempted to replicate the model in the Indian context based on panel data from 1996-2015. However, the results remain inconclusive. The possible results could have been that the Indian market is not efficient enough, or the attributes of the model are not relevant in the Indian context. In this regard, the researcher wishes to have your opinion and suggestions on the **quantifiable** macroeconomic and firm-specific variables (at least five) that are relevant in building the Price-Earning (PE) model.

Factors that affect the PE ratio of a stock in context of Indian stock market:

1) 2) 3) 4) 5)

ANNEXURE III

Publications and presentations by the scholar in the research area

Publications:

1. SouravMazumder*et.al.*Asset Valuation: A synthesis of Existing Literature and New Insights.*The Institute of Cost Accountants of India. Volume 42, No. 1, April 2016 pp. 45-52.*

2. SouravMazumder*et. al*. Efficient Market Hypothesis: A study on Indian Capital Market. *The Institute of Cost Accountants of India. Volume 42, No. IV January 2017 pp. 69-79.*

3. SouravMazumder*et.al.*Stock Valuation model: A Study of Models in Use and Development of a Customized Model in India. *The ICFAI University, Jharkhand, Volume 5, Issue 1, May 2017 pp.1-9.*

Presentations:

1. 'Asset Valuation: A Synthesis of Existing Literature and New Insights' presented in the 'Globsyn Management Conference 2015' organized by the 'Globsyn Business School', Kolkata on 18Dec2015 and won the best paper award.

2. 'Stock Valuation models: A Study of Models in Use and Development of a Customized Model in India' presented in the National Doctoral Conference organized by 'The ICFAI University, Jharkhand' on 09Mar2017 and own the best paper award.

ANNEXURE IV

Results of Whitbeck-Kisor model

2000-2009

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.166[a]	.027	.022	13.09036

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2640.968	3	880.323	5.137	.002[a]
	Residual	93732.593	547	171.358		
	Total	96373.561	550			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	16.696	.875		19.083	.000
	g_eps	-.021	.012	-.076	-1.810	.071
	sd_eps	-.015	.054	-.012	-.280	.780
	div_pay_out	1.023	.298	.148	3.431	.001

Source: Compiled data

Result of Whitbeck-Kisor model

2001-2010

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.177[a]	.031	.026	13.08248

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3277.977	3	1092.659	6.384	.000[a]
	Residual	101321.601	592	171.151		
	Total	104599.578	595			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.748	.856		20.729	.000
	g_eps	-.026	.011	-.096	-2.383	.017
	sd_eps	-.045	.050	-.037	-.895	.371
	div_pay_out	1.005	.274	.151	3.661	.000

Source: Compiled data

Result of Whitbeck-Kisor model

2002-2011

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.210[a]	.044	.039	13.12235

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4902.924	3	1634.308	9.491	.000[a]
	Residual	106589.346	619	172.196		
	Total	111492.270	622			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	19.481	.854		22.815	.000
	g_eps	-.039	.011	-.139	-3.527	.000
	sd_eps	-.100	.047	-.085	-2.132	.033
	div_payout	.968	.255	.151	3.791	.000

Source: Compiled data

Result of Whitbeck-Kisor model

2003-2012

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.212[a]	.045	.041	13.33991

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5403.196	3	1801.065	10.121	.000[a]
	Residual	114423.984	643	177.953		
	Total	119827.179	646			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.620	.872		23.644	.000
	g_eps	-.036	.011	-.127	-3.290	.001
	sd_eps	-.144	.046	-.122	-3.129	.002
	div_payout	.895	.242	.144	3.702	.000

Source: Compiled data

Result of Whitbeck-Kisor model

2004-2013

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.217[a]	.047	.043	14.57980

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7019.891	3	2339.964	11.008	.000[a]
	Residual	141572.041	666	212.571		
	Total	148591.931	669			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	22.515	.952		23.644	.000
	g_eps	-.037	.012	-.117	-3.069	.002
	sd_eps	-.206	.049	-.162	-4.234	.000
	div_payout	.809	.255	.121	3.177	.002

Source: Compiled data

Result of Whitbeck-Kisor model

2005-2014

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.215[a]	.046	.042	15.15287

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7546.026	3	2515.342	10.955	.000[a]
	Residual	156134.359	680	229.609		
	Total	163680.385	683			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	23.206	.976		23.770	.000
	g_eps	-.037	.013	-.111	-2.943	.003
	sd_eps	-.197	.048	-.155	-4.100	.000
	div_payout	.863	.247	.131	3.490	.001

Source: Compiled data

Result of Whitbeck-Kisor model

2006-2015

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.235[a]	.055	.051	16.00336

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10208.784	3	3402.928	13.287	.000[a]
	Residual	175433.653	685	256.108		
	Total	185642.437	688			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	24.534	1.036		23.677	.000
	g_eps	-.040	.013	-.111	-2.964	.003
	sd_eps	-.236	.050	-.177	-4.743	.000
	div_payout	.848	.236	.133	3.585	.000

Source: Compiled data

ANNEXURE V

Rank distribution of Beta and return of portfolios from 1996-2015

RANK	1996	RANK	1997	RANK	1998	RANK	1999
BETA	RETURN	BETA	RETURN	BETA	RETURN	BETA	RETURN
1	3	1	7	1	1	1	6
2	9	2	5	2	5	2	4
3	8	3	10	3	7	3	8
4	1	4	4	4	4	4	2
5	10	5	6	5	3	5	9
6	4	6	1	6	8	6	1
7	2	7	2	7	9	7	10
8	5	8	9	8	2	8	7
9	6	9	3	9	6	9	3
10	7	10	8	10	10	10	5
RANK	2000	RANK	2001	RANK	2002	RANK	2003
BETA	RETURN	BETA	RETURN	BETA	RETURN	BETA	RETURN
1	9	1	10	1	2	1	5
2	8	2	8	2	1	2	1
3	1	3	7	3	4	3	2
4	6	4	4	4	3	4	3
5	3	5	9	5	5	5	7
6	10	6	3	6	6	6	9
7	4	7	2	7	9	7	6
8	5	8	6	8	7	8	4
9	7	9	1	9	8	9	8
10	2	10	5	10	10	10	10
RANK	2004	RANK	2005	RANK	2006	RANK	2007
BETA	RETURN	BETA	RETURN	BETA	RETURN	BETA	RETURN
1	6	1	2	1	1	1	1
2	5	2	9	2	6	2	2
3	7	3	4	3	3	3	3
4	1	4	5	4	2	4	4
5	3	5	6	5	4	5	9
6	8	6	3	6	10	6	6
7	9	7	10	7	5	7	7
8	4	8	8	8	8	8	10
9	2	9	1	9	7	9	8
10	10	10	7	10	9	10	5

RANK	2008
BETA	RETURN
1	10
2	9
3	7
4	4
5	8
6	3
7	5
8	6
9	2
10	1

RANK	2009
BETA	RETURN
1	8
2	2
3	1
4	5
5	4
6	6
7	7
8	3
9	10
10	9

RANK	2010
BETA	RETURN
1	10
2	9
3	8
4	6
5	7
6	2
7	4
8	5
9	3
10	1

RANK	2011
BETA	RETURN
1	10
2	9
3	8
4	6
5	7
6	5
7	4
8	3
9	2
10	1

RANK	2012
BETA	RETURN
1	3
2	6
3	5
4	1
5	7
6	9
7	10
8	8
9	4
10	2

RANK	2013
BETA	RETURN
1	10
2	9
3	8
4	6
5	7
6	4
7	5
8	3
9	2
10	1

Rank	2014
Beta	Return
1	4
2	8
3	5.5
4	7
5	9
6	3
7	10
8	1
9	5.5
10	2

Rank	2015
Beta	Return
1	1
2	6
3	9
4	8
5	2
6	7
7	4.5
8	4.5
9	3
10	10

ANNEXURE VI

CALCULATION OF CUMMULATIVE ABNORMAL RETURN (CAR) – SEMI STRONG FORM OF EFFICIENT MARKET HYPOTHESIS

DAYS	CAR
-30	-0.72
-29	-0.31
-28	-0.80
-27	-1.40
-26	-1.50
-25	-1.64
-24	-1.75
-23	-1.34
-22	-0.89
-21	-1.52
-20	-1.54
-19	-1.61
-18	-0.34
-17	-0.45
-16	-0.28
-15	-0.54
-14	-0.61
-13	-0.64
-12	-0.18
-11	-0.19

DAYS	CAR
-10	0.40
-9	0.52
-8	1.35
-7	1.49
-6	2.92
-5	2.96
-4	2.55
-3	2.12
-2	2.62
-1	3.52
0	3.11
1	2.35
2	1.45
3	2.25
4	2.44
5	2.73
6	3.30
7	3.30
8	3.46
9	3.74
10	3.16

DAYS	CAR
11	3.46
12	3.34
13	2.82
14	3.45
15	3.26
16	3.66
17	4.32
18	4.58
19	4.48
20	4.39
21	3.70
22	3.38
23	3.66
24	5.05
25	5.38
26	5.99
27	5.87
28	4.95
29	4.72
30	4.35

CALCULATION OF CUMMULATIVE ABNORMAL RETURN (CAR) – STRONG FORM OF EFFICIENT MARKET HYPOTHESIS

DAYS	CAR
-30	0.16
-29	0.49
-28	0.27
-27	0.13
-26	-0.11
-25	0.33
-24	0.72
-23	0.73
-22	0.27
-21	-0.26
-20	-0.16
-19	-0.60
-18	-0.16
-17	-0.40
-16	0.14
-15	0.26
-14	-0.23
-13	-0.52
-12	-0.46
-11	-0.27

DAYS	CAR
-10	0.46
-9	1.05
-8	0.47
-7	0.37
-6	0.43
-5	0.84
-4	1.25
-3	1.37
-2	1.14
-1	0.59
0	1.09
1	0.91
2	0.51
3	0.01
4	0.16
5	0.54
6	1.07
7	1.53
8	1.10
9	1.11
10	1.10

DAYS	CAR
11	1.38
12	1.32
13	1.11
14	1.09
15	0.40
16	1.15
17	1.30
18	0.92
19	0.55
20	0.46
21	0.33
22	0.70
23	0.52
24	1.13
25	1.21
26	0.78
27	0.78
28	0.36
29	0.25
30	0.09

Glossary

Beta: Beta represents the measure of extent to which the return of financial asset fluctuates with the return on the market portfolio. It is measured as the covariance between the return of financial asset upon the variance of the market return.

Capital market: It is the market where financial assets are traded that have a long or indefinite maturity. It is divided by two segments: primary market and secondary market.

Cost of equity capital: The rate of return required by equity shareholders.

Debt/Equity ratio: Debt Equity is measured by the total debt (short term and long term) upon net worth and preference capital.

Financial risk: Financial risk refers to the risk arising from capital structure, i.e. the proportion of debt and equity in the capital structure.

Interest coverage ratio: Interest coverage ratio is another kind of leverage ratio which shows the relationship between debt servicing commitments and the source for meeting this burden. Interest coverage ratio is represented as Earnings before Interest and Taxes (EBIT) upon debt interest.

Price-earnings ratio: Price-earnings ratiois measured by market price per share upon earnings per share.

Return on Capital Employed (ROCE): The numerator is the operating profit instead of net profit as considered in the return on equity formula. It represents the ratio of the operating profit in proportion of the shareholders' equity and is widely used as a profitability ratio.

Return on Equity (ROE): The numerator of this ratio is the profit after tax less preference dividends and the denominator includes all contributions made by equity shareholders (Paid up capital + Reserves and surplus). The Return on Equity (ROE) measures the profitability of the equity funds invested in the firm. It is regarded as a very important measure because it reflects the productivity of the ownership (or risk) capital employed in the firm.

Return on Investment (ROI): It is measured as the earnings before interest and taxes upon the investment made by the company. ROI is the measure of the business performance and verified if it is internally consistent. It abstracts away the effect of financial structure and is eminently used for inter-firm comparison.

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