

AN EMPIRICAL ANALYSIS OF LEGAL INSIDER TRADING IN INDIA

Thesis

Submitted in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

By

M. ANIL KUMAR



**SCHOOL OF MANAGEMENT
NATIONAL INSTITUTE OF TECHNOLOGY
KARNATAKA,
SURATHKAL, MANGALORE -575025**

July, 2018

DECLARATION

by the Ph.D. Research Scholar

I hereby *declare* that the Research Thesis entitled **An Empirical Analysis of Legal Insider Trading in India** Which is being submitted to the National Institute of Technology Karnataka, Surathkal in partial fulfillment of the requirements for the award of the Degree of Doctor of Philosophy in Management is a *bonafide report of the research work carried out by me*. The material contained in this Research Thesis has not been submitted to any University or Institution for the award of any degree.

Register Number : 138002HM13F05

Name : M Anil Kumar

Signature of the Research Scholar :

Department : School of Management

Place: NITK-Surathkal

Date:

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Dr. Rajesh Acharya H.
Research Guide

Prof. K B Kiran
Chairman - DRPC

A C K N O W L E D G E M E N T

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ABSTRACT

The motive of this research is to examine the insider trading behavior in the Indian stock market and to determine the profitability and information content of insider trading. It also aims to investigate the relationship between insider trading and stock market crashes. The empirical study is based on disclosures made under SEBI (Prohibition of Insider Trading) Regulations, 1992 to Bombay Stock Exchange (BSE), which comprises the insider transactions of all the listed companies of BSE from April 2007 to March 2015. The study uses the four-factor asset pricing model that adjusts for size, book to market and momentum factors and event study methodology. The empirical results confirm that insiders seem to have a preference for large market capitalization companies, companies with low BE/ME ratio, high momentum, and low P/E ratio. The analysis of abnormal returns to insider trading strategies shows that insider purchase portfolios earn positive abnormal return and sale portfolios earn negative abnormal return. However, outsider group does not earn significant abnormal return during the same period. The results also show that insider purchase as well as sale portfolios earn positive abnormal return in the pre-event window, whereas purchase portfolio earns positive abnormal return and sale portfolio earns negative abnormal return in the post-event window. Insider purchase and sales over a year's time play a major role in causing stock market jump and crash respectively. Insiders trading activity diminishes substantially just ahead of the crash or rally, whereas outsiders trading activity increases just ahead of crash of rally. The findings of the present study substantially exceed the previously documented degree of predictability of insider trading.

Keywords: Insider trading, Fama and French, Carhart four-factor model, Information Asymmetry, Information Content, Event Study, Abnormal Return, Crash, Rally, Emerging Markets, India.

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NOMENCLATURE

- Auto Regressive (AR)
- American Stock Exchange (AMEX)
- Bombay Stock Exchange (BSE)
- Capital Asset Pricing Model (CAPM)
- Centre for Monitoring Indian Economy (CMIE)
- Centre for Research in Security Prices (CRSP)
- Chief Executive Officer (CEO)
- Chief Financial Officer (CFO)
- Corporate Social Responsibility (CSR)
- Initial Public Offering (IPO)
- Kuwait Stock Exchange (KSE)
- Milan Stock Exchange (MSE)
- National Association of Securities Dealers Automated Quotations (NASDAQ)
- National Stock Exchange (NSE)
- New York Stock Exchange (NYSE)
- Open Market Repurchase (OMR)
- Over The Counter (OTC)
- Sarbanes-Oxley Act (SOX)
- Securities and Exchange Board of India (SEBI)
- Securities and Exchange Commission (SEC)
- Securities Appellate Tribunal (SAT)
- Toronto Stock Exchange (TSE)
- United Kingdom (UK)
- United States (U.S.)
- Unpublished Price-Sensitive Information (UPSI)
- Vector Auto Regressions (VAR)
- Volume-Weighted Average Price (VWAP)

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

'Insider means any individual who has access to Unpublished Price Sensitive-Information (UPSI¹) on securities of a company,' conferring to Securities and Exchange Board of India (SEBI) (Prohibition of Insider Trading) Regulations, 1992. Insider trading means trading by any individual in the securities of a company by having price sensitive information before it is available to the general public. In a similar vein, section 195 of the Companies Act, 2013 states that insider trading is an act of buying, selling, subscribing or agreeing to subscribe in the securities of a company directly or indirectly by the key management personnel or the director of the company who is anticipated to have access to UPSI with reference to securities of the company and it is deemed to be insider trading.

There is a perception about insider trading that it is associated with prohibited behavior. It is an action of purchasing and selling of securities by an individual having UPSI of the company before it is accessible to the common public with an objective of creating abnormal earnings and evading losses (Corporate Governance an Emerging Scenario, published by National Stock Exchange (NSE), 2010). When a corporate insider trades by adhering to all the regulations it is called legal insider trading and any violation of that amounts to illegal insider trading. Therefore, to monitor insider trading activities, they are required to disclose their legal trades to SEBI promptly. The present study is related to the legal insider trading.

In 1934, the Securities and Exchange Commission (SEC) began regulating insider trading in the United States (US). As argued by Bernardo (2001), sixty-five years later, the merits of insider trading regulation continue to be debated by legislators, legal scholars, and economists. If insider trading is permitted, outside investors are

¹ UPSI can be defined as private information such as, takeover decisions, mergers and acquisitions, earnings announcements etc. which are generally available for the top level management of the firm.

hurt and retail investors' expected return is reduced as shown by Leland (1992). Contrary to the general perception, Manne (2005) has argued that insider trading will improve market efficiency and should not be regulated. However, there is an overwhelming opinion emanating from different sections which argues for regulating the insider trading. When compared to the developed markets, emerging markets like India are less efficient in dealing with the insider trading charges and prosecution of insiders (Misra 2011). A study by Fernandes and Ferreira (2009) using the data from 48 countries on insider trading laws and stock price informativeness has found that efficiency of insider trading regulation depend on the quality of legal institutions of the country.

In Indian context, corporate insiders are allowed to trade in their own company's stock but are required to disclose these transactions to avoid the misuse of any non-public price sensitive information. SEBI has framed numerous disclosure regulations on insiders to build investor confidence and increase the transparency in securities trading. The aim of these disclosures is to create a level playing field to all the participants in the market.

Companies Act, 2013, passed by the Indian parliament also devised the code of conduct for the administration of insider trading regulations. The listed companies in India are guided by Clause- 36 of the Listing Agreement of the stock exchanges, which states that, the issuer will have to inform the stock exchange where the company is listed immediately about events such as closure on account of power cuts, lockouts, strikes, etc. All events which may have a posture on the operations or performance of the firm, as well as price sensitive information have to be reported at the beginning of the event as well as after the end of the event. This is intended to facilitate the shareholders and the public to assess the information and act accordingly. Over the years, to improve the fairness and transparency of the capital markets, SEBI has made several amendments to its SEBI (Prohibition of Insider Trading) Regulations, 1992.

Trading by the corporate insiders takes place lawfully daily when the employees, directors or officers, and other corporate insiders purchase or sell securities of their

own company within the restrictions of the company policy and the code of practice prevailing for listed companies.

1.2 EVOLUTION OF INSIDER TRADING REGULATION IN INDIA

Evolution of insider trading regulations in India dates back to 1978 when the Sachar Committee stated that company personnel like board members, accountants, company secretaries, etc. might have certain price sensitive information. Such information may be used to influence stock prices, which could affect the market sentiments. The Committee suggested that there must be alterations to The Companies Act, 1956, so that it can prevent such practices. In 1986, Patel Committee recommended amendments to Securities Contracts (Regulation) Act, 1956 en-route for restraining insider trading through supervisory machinery. In 1989, Abid Hussein Committee suggested that civil and criminal actions should be imposed on insider trading actions. Besides, it put forward the idea that SEBI has to formulate the guidelines and regulations to avoid insider trading.

In the light of the recommendations of various committees by means of the endorsements, SEBI formulated, SEBI (Prohibition of Insider Trading) Regulations, 1992. All the listed companies and market intermediaries have to act by the directions of this regulation.

1.2.1 An overview of SEBI (Prohibition of Insider Trading) Regulations, 1992

SEBI has framed insider trading regulations through SEBI (Prohibition of Insider Trading) Regulations, 1992 which came into force in 1992. It has framed several restrictions on insider trading. The listed companies must have a compliance officer and preserve the price sensitive information. It has introduced trading window for the insiders to trade and timely reporting of their transactions in securities to the compliance officer and the stock exchanges. The disclosures made by the listed companies or their directors/officers have to be displayed by the respective stock exchange on their official websites instantly.

SEBI amended its regulations in February 2002 by mandating policy on disclosures and internal procedures for the prevention of insider trading. It is mandatory for any individual who holds more than 5 percent shares or voting rights in any listed company to disclose his/her holdings to the company within four working days. It also made compulsory continual disclosures by the director/officer whenever there is a change in their holdings exceeding Rs. 5 lakh in value or 5,000 shares or 2 percent of the total shareholding or voting rights whichever is lesser. All the listed companies have to report to the respective stock exchange where the company is listed within five days of such transactions. SEBI has prepared a model code of conduct for deterrence of insider trading for other entities and also introduced penalties for contravention of the code of conduct.

In July 2003, SEBI further made amendments with the introduction of disclosure forms 'A', 'B', 'C', and 'D' for directors/officers. Form A consists of the details of the acquisition of shares in a listed company about 5 percent or more. Form B contains details of the listed company shares held by the director or officer. Form C entails the details of the change in listed company shareholding in respect of individuals holding more than 5 percent shares. Form D comprises details of listed company shareholding of directors or officers.

SEBI added regulation 11A i.e. manner of service of summons and notices issued by the board in case of insider trading in April 2007.

SEBI amended its regulations in November 2008, added e-filing of the disclosures to the stock exchanges and regulation- 14 involving the actions in case of default. It made obligatory for a director/officer and his/her dependents to disclose to the company the holdings of derivative contracts in a listed company in Form B within two working days of becoming a director. They also cannot take positions in derivative contracts in the shares of the company. The directors/officers/designated personnel of listed companies who buy or sell any number of shares shall not make round-trip transactions or short/swing trades i.e. buy or sell any number of shares through the next six months subsequent to the prior transaction. In the case of Initial Public Offering (IPO), they have to hold the shares if allotted for a minimum period

of 30 days. It also made compulsory continual disclosures by the director/officer whenever there is a change in their holdings beyond INR 5 lakh in value or 25,000 shares or 1 percent of the total shareholding or voting rights, whichever is lesser. All the listed companies have to report to the respective stock exchanges where the company is listed within two working days of such transactions. Measures are taken to prevent insider trading and to strengthen disclosure requirements for the insiders.

In order to bring uniformity in disclosure requirements among several SEBI regulations, it has amended the act in August 2011. The disclosure requirement with respect to continual disclosures by the director/officer whenever there is a change in their holdings beyond INR 5 lakh in value or 25,000 shares or 1 percent of the total shareholding or voting rights, whichever is lesser. Takeover Regulations have been amended in line with SEBI (Prohibition of Insider Trading) Regulations, 1992. Form B and Form D were also amended accordingly in relation to the promoter and his/her dependent holdings in derivative contracts of listed companies.

SEBI constituted a high level committee to review insider trading regulations with a retired Chief Justice of Karnataka High Court and a former presiding officer of the Securities Appellate Tribunal (SAT) Mr. N.K. Sodhi as chairman in March 2013. In December 2013, the committee submitted report on SEBI (Prohibition of Insider Trading) Regulations, 1992 to the SEBI. The Committee recommended strengthening the legal and enforcement framework, aligning insider trading norms with international standards and clarity in the definitions and concepts of insider trading.

In January 2015, SEBI announced an amendment by strengthening the insider trading rules with clarity in the definition and concepts of insider trading. It has detailed on who is a connected person and also about the UPSI. It has imposed restrictions on communication and trading by insiders. Insiders with price sensitive information can trade with a pre-scheduled trading plan which has to be disclosed to the public six months before the transaction. The initial disclosures of holdings have to be made to the stock exchange by the Promoter/Director within seven days of their appointment with the company. Under continual disclosures, it has made it mandatory for every listed company's promoter/employee and director to disclose the number of

shares/derivatives purchased or sold within a period of 3 months valuing INR 10 lakh or more. These trades have to be reported to stock exchange within two trading days. It has formulated minimum standards for a code of conduct to regulate, monitor and report trading by insiders. SEBI is empowered to investigate any complaint received from the investors, intermediaries or any other individuals on any matter having a bearing on allegations of insider trading.

In a nutshell, SEBI (Prohibition of Insider Trading) Regulations, 1992, prohibits an insider from dealing with his/her behalf or on behalf of any other individual in the securities of a firm listed on any stock exchange when he/she is in ownership of UPSI. Additionally, it also prohibits any insider from communicating, recommending, or providing (directly or indirectly) any UPSI to any individual who, while in the ownership of such UPSI, should not trade in securities. Price sensitive information means any information that is related directly or indirectly to a business concern, if published, is expected to affect the price of the securities of a company substantially. It includes information such as the financial results, dividends, change in capital structure, mergers, de-mergers, acquisitions, delisting, changes in key management personnel, and disposals and expansion of business.

There have been cases of certain listed companies giving monthly disclosures of certain price sensitive information like production/ turnover/ sales to their relevant industry associations without disclosing the same to the stock exchanges. To limit this exercise, the SEBI has made it obligatory for listed companies to disclose such price sensitive information first to the Stock Exchanges. (Indian Securities Market a Review, 2013, published by NSE).

1.3 THEORETICAL BACKGROUND

The present study broadly falls under the ambit of market efficiency theory. Fama (1991) defined Efficient Market Hypothesis (EMH) as a state where security prices fully reflect the available information in the market. Literature on EMH is broadly classified under three heads, weak form, semi-strong form and strong form of EMH. The weak form of EMH concentrates on the tests of return predictability based on the

past returns or the historical data. Studies under this category largely depended on the tests of return predictability, statistical tests of independence like autocorrelation test, runs test, etc. Some of the early empirical tests of weak form of EMH include Fama (1965), Fisher (1966) and Lo and MacKinlay (1988) who documented the presence of autocorrelation in past returns, whereas, Fama and French (1988) documented that stock prices are more volatile when market is open compared with overnight non-trading hours. Several studies examined the return predictability based on other forecasting variables like Basu (1977) based on Price to Earnings (P/E) ratio, Banz (1981) based on size of the firm, and Rosenberg et al. (1985) based on Book Value to Market Value of Equity (BE/ME) ratios. Further, seasonality in stock return has been examined by Cross (1973), French (1980), Ariel (1987 and 1990) and Harris (1986). Findings of these studies raised questions about the efficiency of the stock market based on weak form definition.

Semi-strong form of efficiency studies largely relied on event study methodology to examine the impact of specific corporate events on the stock prices. Impact of stock split on firm value has been examined by Fama et al. (1969), Desai and Jain (1997), Ikenberry et al. (1996), whereas Miller and Reilly (1987), Ibbotson et al. (1994), Ritter (1991), and Carter and Manaster (1990) have examined IPO issue. Another important corporate action examined in the extant literature is mergers and acquisitions by Asquith et al. (1983), Mitchell and Mulherin (1996) and Agrawal et al. (1992). Under this category also predictable pattern in stock price has been observed with regard to specific events.

Strong form EMH tests relied on examining the actions of corporate insiders and stock market specialists on market outcome. Jaffe (1974) documented that market was not efficient for insiders and Seyhun (1986) confirmed abnormal returns to insider trading. In the same vein, Chowdhury et al. (1993) and Pettit and Venkatesh (1995) also confirmed that insiders consistently enjoyed above average profits. Overall, the findings of the studies on the actions of corporate insiders, stock market specialists and others with the knowledge about the company which is not in the public domain could earn abnormal returns.

Several empirical studies have documented findings which contradict all three forms of the EMH. However, the proponents of the EMH argue that return anomalies are very sensitive to the methodology used in the study. A reasonable change in the methodology led to the disappearance of the return anomalies and even if it is present, it was economically marginal. Several anomalies are not amenable to out of sample prediction. Therefore, it is not possible to make a viable investment or trading strategy to earn a return over and above the market.

The present study based on insider trading fits into the strong form of the EMH and attempts to test it in the Indian context from different angles.

1.4 RESEARCH GAP

From the review of the extant literature, it is clear that the close examination of the role of the insider trades is very much essential. It is also evident that there is an apparent dearth of empirical studies on this issue in the emerging markets in general, and an important emerging market like India in particular. There are a limited number of studies dealing with this issue in the Indian context. For example, Jain and Sunderman (2014) have examined the role of insider trading around mergers, Khanna and Palepu (2000), Sarkar and Sarkar (2000) have examined the impact of insider trading on the market value of the firm. The study conducted by Chauhan et al. (2014) was based on the proprietary data of NSE. Since the data used in the study is not in the public domain, its implications for investors are very limited.

Various dimensions of the insider trading remain under-explored in the Indian context. Further, the direction of insider trading strategies and its utility to ordinary investors and effect of insider trading regulations on the pattern of insider trading is largely unexplored. Specifically, the broad-based market outcome of the insider trading and patterns in insider trading needs further examination by expanding the dimensions used for finding the patterns. Therefore, an apparent gap regarding empirical findings on various dimensions of insider trading is observed and therefore, the present study intends to fill this gap.

1.5 RESEARCH PROBLEM & RESEARCH QUESTIONS DEFINED

Research problem centers on the idea of gaining a better understanding of the insider trading in the Indian context. The study seeks to decipher the pattern of insider buying and selling across various styles. Is there a possibility of insiders making abnormal profit and viability of following insider trades as an investment idea to be followed by the outsiders? Whether the information advantage in insider transactions reflects for outside investors to follow insiders, and earn abnormal returns from insider trading disclosures? The focus is on gaining a better understanding of the effects of insider trading on the broad-based market in the immediate short run and the long run. Insider trading regulations evolve over a period shedding light on the impact of regulations on insider trading.

On this backdrop, following research questions are framed:

1. What are the determinants of insider trading and do they follow any specific pattern?
2. Whether insiders earn abnormal return?
3. What is the information content of insider trading in India?
4. Does insider trading signal future market crashes or rallies?

1.6 RESEARCH OBJECTIVES

Following are the objectives of the study.

1. To identify the determinants of insider trading.
2. To quantify the abnormal returns to insider trading strategies.
3. To assess the information content of insider trading.
4. To analyze impact of insider trading signals on future market crashes or rallies.

1.7 RESEARCH HYPOTHESES

Following are the hypotheses of the study.

Hypothesis 1

H0-Insider trading does not follow any particular pattern.

H1-Insider trading follows a particular pattern.

Hypothesis 2

H0-Insider trading does not yield abnormal returns.

H1-Insider trading yields abnormal return.

Hypothesis 3

H0-There is no information advantage possessed by the insiders compared to outsiders.

H1-There is an information advantage possessed by the insiders compared to outsiders.

Hypothesis 4

H0-Insider trading does not signal future market movement.

H1-Insider trading signals future market movement.

1.8 JUSTIFICATION

The rationale for the present study stems from the fact that there are very few studies on this subject with regard to the emerging markets. Since India is an important emerging market, the findings of the study will be of significance. The study is based on publicly available data, as a result, the findings of the study shall be beneficial to the ordinary investors who do not have access to inside information and depend only on the publicly available information for investing. Therefore, the study is justified from the viewpoint of ordinary individual investors. The findings of this study are equally important to the regulators to understand the strategies pursued by the insiders and that may help them to devise the regulations accordingly. It also gives an opportunity to assess the effectiveness of insider trading laws in creating a level playing field between insiders and outsiders. Therefore, overall, the study has relevance for investors as well as the regulators.

1.9 NATURE AND SOURCE OF DATA

The study collects data from two prominent sources, namely Bombay Stock Exchange (BSE) and Centre for Monitoring Indian Economy (CMIE) Prowess database. BSE is the source of data on insider trading based on the insider trading disclosures made to

BSE by the listed companies. The insider trading transactions from 5,300 listed companies of BSE reported under SEBI (Prohibition of Insider Trading) Regulations, 1992 are considered for the present study. The data set consists of scrip name, name of the acquirer/seller, transaction date, purchase/sale, mode of purchase/sale, number of shares transacted, holding after the transaction, regulation and report to exchange date. The data period ranges from April 2007 to March 2015. CMIE Prowess database is the source for the data relating to market capitalization, book value per share, and closing prices.

1.10 METHODOLOGY

The exploratory research approach is adopted with suitable econometric techniques. The objective wise methodology has been given below with relevant references.

1. Analysis of the determinants of insider trading is based on the logistic regression approach. Dependent variable of the regression is '1' if an insider is purchasing the stock, whereas takes the value '0' if it is selling. Further, explanatory variables are either taken from the transaction related information or variables created taking cue from the multifactor asset pricing models of the class of Fama and French (1993) and Carhart (1997). Possibility of changes in the insider trading due to changes in the regulation is accounted by taking dummy variables to represent different years in the study period. The study estimates the model on the data set for the entire study period except the last quarter which is preserved for out-of-sample prediction. Predictive power of the model is based on the correct prediction of whether the transaction is purchase or sale for in-sample as well as out-of-sample. Methodology of this objective is similar to the studies like Inci and Seyhun (2010), Robbins (2010), Jategaonkar (2013), Ullah et al. (2013), Chen et al. (2014), and Wang (2013).
2. Second objective deals with estimation of abnormal returns to insider transactions. For this purpose, study creates portfolios based on the direction of insider transaction (purchase or sale) and based on the frequency of their transaction within purchase and sale. Further, portfolios are created based on the standard

strategies like size, Book Value to Market Value of Equity (BE/ME) ratio, momentum and Price to Earnings (P/E) ratio. The study uses multifactor asset pricing model in line with Fama and French (1993) and Carhart (1997) for the abnormal return calculation. Findings of the portfolios based on insider transactions are compared with the broad based market return in similar categories after controlling for insider transactions. Extant studies like Jaffe (1974), Seyhun (1992), Pettit and Venkatesh (1995), Jategaonkar (2013), Ullah et al. (2013), and Chen et al. (2014) form the basis for the methodology.

3. Third objective deals with the information content of insider trading using event study methodology. Study analyses the cumulative abnormal return of insider portfolios constructed separately for insider purchase and sale transactions for a 30 days event window before and after the insider transactions. Further, insider portfolios are constructed across size, BE/ME ratio, and momentum for purchase and sale transactions of the insiders. Market return in similar categories after excluding insider transactions is used to compare the profitability of insider transactions. Multifactor asset pricing model in the form of Fama and French (1993) and Carhart (1997) forms the basis for calculating the abnormal returns. Methodology of this objective is in line with the extant studies like Fidrmuc et al. (2006), Wang (2013), Jategaonkar (2013), Chen et al. (2014) and Jain and Sunderman (2014).
4. Fourth and final objective analyses the possibility of insider trading causing market crashes and rallies. Panel logistic regression forms the core methodology of this objective. Market crash and rally is defined in terms of actual and abnormal return. Dependent variable takes the value of '1' for the presence of crash or rally and '0' otherwise. Explanatory variables are taken from the trade related information from the insider transaction data set and variables created based on abnormal return. Methodology of this objective is in line with Marin and Olivier (2008), Gangopadhyay et al. (2009), Korczak et al. (2010) and Betzer and Theissen (2010).

1.11 CHAPTER DESIGN

The present study is organized into seven chapters. A brief description about the chapters is as follows:

Chapter 1: This is an introductory chapter which covers introduction to insider trading, evolution of insider trading regulation in India, an overview of SEBI (Prohibition of Insider Trading) Regulations, 1992, in India, theoretical background, research gap, research problem and research questions defined, research objectives, justification for the study, research hypotheses, framework of the study, nature and source of data, and methodology of the study.

Chapter 2: This chapter deals with the research objective-wise brief review of literature related to insider trading.

Chapter 3: This chapter deals with the first objective, the determinants of legal insider trading. It has following sections: introduction, data and methodology, empirical results, and conclusion.

Chapter 4: This chapter deals with the second objective, insider trading and abnormal stock returns. The sections in this chapter are as follows: introduction, data and methodology, empirical results, and conclusion.

Chapter 5: In this chapter, third objective on the information content of insider trading is presented. It consists of an introduction, data and methodology, empirical results, and conclusion sections.

Chapter 6: This chapter deals with the fourth objective on the analysis of the impact of insider trading on stock market crashes and rallies. It has following sections: introduction, data and methodology, empirical results, and conclusion.

Chapter 7: The last chapter outlines the summary, conclusion, contribution to the body of knowledge, limitations of the study, and scope for the further research.

CHAPTER 2

REVIEW OF LITERATURE

Analyzing insider trading has been of interest in the academic finance literature for quite some time. Though insider trading can be legal as well as illegal, academic finance literature largely deals with the legal insider trading. The analysis of legal insider trading is interesting because in spite of all disclosure requirements, whether it is possible for insiders to get the benefit of the unpublished price sensitive information over outsiders is a research question. In this chapter, the study reviews some of the relevant studies in the context of legal insider trading.

Insider trading has been a topic of interest to practitioners as well as academicians for the last few decades (Jain and Sunderman 2014; Hansen 2013; Fernandes and Ferreira 2009). There is a common misperception on the part of the public regarding insider trading as an illegal activity. When a corporate insider trades by adhering to all the regulations is called legal insider trading and any infringement of that amounts to a prohibited act. There are arguments for legalizing insider trading as well as against it. For example, Manne (1966) says that insider trading has to be permitted, it will make the market efficient by releasing the economic information about the firm, whereas Leland (1992) is against legalizing insider trading, argued that if insider trading is permitted, retail investors' expected return is reduced and hurts their financial interest. The prevention of insider trading is a highly challenging task, as reported by Hansen (2013), who interviewed prosecutors and investigators and says that insider trading could not be averted because the regulatory bodies focus on detection and prosecution, but not on prevention. Since it is not possible to elicit from insiders unbiasedly and directly the intentions behind their trades, the evidence is certainly inferred on the litigation avoidance hypothesis.

2.1 DETERMINANTS OF LEGAL INSIDER TRADING

The literature on insider trading and its relation with the fundamentals of the firm are reviewed here. To prevent trading on material non-public information, corporate

insiders face various restrictions on their trading (Roulstone 2003). The regulatory bodies have enforced strict disclosures of key events and restrictions on insider trading which led to huge changes in insider trading patterns (Zhu 2010). All the listed companies have to disclose such events to the appropriate stock exchange on a timely basis. Because of the availability of insider trading disclosures, most of the financial analysts keep track of insider trading activities to decipher the future profitability of companies. They specialize in gauging insider transactions and try to predict the market fluctuations and rebalance their portfolios to earn profits. Numerous investors presume that insiders have better information about the company and thus brokers, dealers and investment advisors carefully follow the insider transactions (Lee and Lu 2008).

As documented by Piotroski and Roulstone (2005), the insiders trade based on stock misvaluation infers that insiders often act like arbitrageurs, take advantage of valuation errors arising from outsiders' inferior valuation models and biased judgments. Leland (1992) and Du and Wei (2004) consider that emerging stock markets are substantially volatile than the developed markets irrespective of the economic fundamentals and high market volatility; it was found to be associated with more insider trading.

The study by Wang (2013) using fixed effects Logit model and the Fama and French (1993) model has found that insiders prefer small and value stocks which had significant price movements in the past. The study has unveiled that the directors trading motives vary with their transaction size. On the other hand, the study on the US market by Rozeff and Zaman (1998) examines whether insider trading is random or follows any systematic pattern. Based on a data set pertaining to 1978-1991, the study has found that insider transactions are not random across growth and value portfolios. Insider purchases increase as the stock changes from growth to value category and insider purchases are more after low stock returns. It also found that insider purchases decrease after high stock returns. They argue that the insider trading behavior conforms to the contrarian approach to stock investing. Cheuk et al. (2006) study on Hong Kong stock exchange for the period 1993 to 1998 find that insider

trading activities depend upon the firm-specific factors like size, book-to-market equity and price-earnings ratio.

A wide variety of governance features are used to measure the governance structure of companies on the Toronto Stock Exchange (TSE) in Canada (Jackson et al. 2008). The study has found that there is no correlation between Chief Executive Officer (CEO) earnings and insider trading risks. It also states that the large size company's insiders have a significant impact than the small and medium-size companies. Earlier studies have found that many pre-determined firm attributes anticipate stock returns in the cross-section of stock returns. For e.g. Firth et al. (2011) have investigated the legal insider trading activities of the directors of the listed companies' of the Hong Kong Stock Exchange over the period 1993 to 1999. The study has found that insider purchases appear to signal undervaluation and insider sales seem to indicate overvaluation of stocks. However, the outsiders who follow insiders' transactions earn minimal returns.

In order to assess the effectiveness of changes in the regulation of insider trading, Jaffe (1974) has examined the issue using Capital Asset Pricing Model (CAPM) methodology and found that changes in regulations had no effect on insider trading. By estimating with Fama and French (1993) model, Knewtson and Nofsinger (2014) have scrutinized insider trading portfolios of buy transactions returns before and after the implementation of Sarbanes Oxley Act (SOX) in the US. They have provided evidence that Chief Financial Officer (CFO) based portfolios remain profitable post-SOX compared to returns for CEOs. CFO purchases earn more returns than CEO purchases because the latter face more disclosures and scrutiny. Budsaratagoon et al. (2012) study from Thailand suggests that adopting a developed market regulation by the emerging market regulators is inappropriate as the market characteristics are different for the countries.

Reviews in this section show that insiders can trade on relevant information before the disclosure of the news made to the general public. Therefore, to prevent trading on material non-public information, corporate insiders face various restrictions on their trading. Insider trading is not random across the cross-section of listed stocks but

follows a specific pattern. Insiders have a preference of particular categories of stocks for purchase and sale. Trading by different categories of insiders in a company and insiders of different categories of a company has different market outcomes.

2.2 INSIDER TRADING AND ABNORMAL STOCK RETURNS

Studies on insider trading and abnormal returns are reviewed in this section. By analyzing reported insider trades using CAPM and Carhart (1997) four-factor model, Jeng et al. (2003) have found that insiders purchases earn abnormal returns of more than 6% per year and insider sales do not earn significant abnormal returns. Prior research has cited that insiders profit from trading and outsiders can also earn a profit by mimicking the insiders' transactions in their portfolios (Seyhun 1986; Jaffe 1974). The literature review conveys that insider trading has outperformed the market in the short-run, but not in the long-run.

The study conducted by Fidrmuc et al. (2006) in the United Kingdom (UK) has stated that insider trading behavior conveys a signal to the market for the outsiders to follow. Similarly, the study of Lakonishok and Lee (2001) has examined the insider transactions on New York Stock Exchange (NYSE), American Stock Exchange (AMEX) and National Association of Securities Dealers Automated Quotations (NASDAQ) from 1975 to 1995 and document that insiders profit from purchases but not from sales. The insider trades signal a way for outsiders to benefit from knowing insider transactions. Further, studies have been conducted to know whether outsiders can follow the insiders to earn abnormal returns. Similarly, Rozeff and Zaman (1988) have examined the SEC filings from 1973 to 1982, using market model. They have concluded that outsiders could follow the disclosures of insider trading and earn abnormal returns by imitating insider trades.

Based on Probit model, Betzer and Theissen (2010) study on German stock market has concluded that reporting delays are longer in the firms with discrete ownership and insiders gain abnormal return between the transaction date and the reporting dates. The regulatory body has to monitor the insider trading disclosures for a timely reporting which will increase the information efficiency of prices. Abumustafa and

Nusair (2011) by using the data from International Financial Corporation (IFC) built a daily index of large companies and most liquid stocks in NYSE and Kuwait Stock Exchange (KSE) to find the profitability of insiders during the 2008 financial crisis. They found that insider trading was profitable in the short run and not profitable in the long run. Lei et al. (2012) using Volume Weighted Average Price (VWAP) have concluded that corporate insiders earn returns on both purchase and sale of stocks on an average. Authors illustrate that insiders who traded well in the past continue to trade well over time and insiders who executed well in purchase transactions of shares also perform well in sale transactions.

To find the insider trading around the financial crisis, Ullah et al. (2013a) state that insiders earn abnormal returns during the financial crisis than the normal trading. On the other hand, Griffin et al. (2014) have examined SEC filings of violation disclosures and proved with market model and time series regressions that insiders earn a positive return after disclosures and also found that insiders sell more before disclosures and buy after such disclosures are made. To know the impact of false information of insider trading Ullah et al. (2013b) have studied the case of US with a data set of SEC filings by using the Fama and French (1993) three-factor model and concluded that false information generates both abnormal returns and abnormal trading volume.

Earlier study on insider trading in the US markets by Finnerty (1976) has considered the entire population of insiders and evaluated the performance of average inside trader. The study documented that average insiders earn significant abnormal returns. Seyhun (1992) has examined SEC filings from 1975 to 1989 using Auto Regressive (AR) model. The study has concluded that the aggregate net number of open market purchases and sales by the corporate insiders in their company anticipate up to 60 percent of the difference in one year advance aggregate stock returns.

Based on Carhart (1997) four-factor model, Jategaonkar (2013) documented that insider transaction with more buy quantity before Open Market Repurchase (OMR) announcements earn abnormal stock returns both in the short-run and long-run. The study of Milan Stock Exchange (MSE) of Italy based on data from 1997 to 2003, Bajo

(2010) examined the abnormal trading behavior of insiders. The study has found that insider trades give positive signals to the outside investors.

Overall, the reviews in this section convey that insiders are likely to earn abnormal returns on their transactions compared to the market owing to their position. Further, abnormal returns earned by different categories of insiders are different depending on the disclosure restrictions. However, evidence on the possibility of outsiders following insider transaction to earn abnormal returns is rather mixed.

2.3 INFORMATION CONTENT OF INSIDER TRADING

The research studies related to the information content of the insider trading are reviewed in this section. Event study of insider trading in extant studies are carried out in two ways; first, pre-selected informational events of the company's corporate announcements as mentioned in the studies of Penman (1982, 1985), Givoly and Palmon (1985), Netter and Mitchell (1989), Hirschey and Zaima (1989), Mikkelson and Partch (1990), Karpoff and Lee (1990). Second, considering the insider transaction day i.e. insider purchase/sale activity as an event as evidenced in the studies by Lorie and Niederhoffer (1968), Jaffe (1974), Finnerty (1976), Baesel and Stein (1979), Seyhun (1990), Lin and Howe (1990). The present study considers insiders transaction day as the event day.

To know the effect of firsthand information of insiders, Meulbroek (1992) has investigated the SEC filings from 1980 to 1989 based on event study methodology and found that firsthand information of the insiders' signals price momentum for market participants and portfolio managers to devise portfolio strategies by tracking insiders trading volume. Using data from 2000 to 2003, based on the logistic regression model, Gangopadhyay et al. (2009) have illustrated that insider purchases are positively related to a company's book to market equity ratio and negatively related to the company's size. Moreover, the study has found that insider trades are profitable in volatile markets as it shows that they trade on the useful private information. The study by Inci and Seyhun (2010) with CAPM model and Fama and French (1993) model has showed that the intraday trading behavior of isolated insider

trades offer important new information to market participants and they are integrated more fully in stock prices as compared to non-insider trades.

A study by Baesel and Stein (1979) with the data for the period from January 1968 to December 1972 using CAPM states that information might be the key to differential rewards from investment in capital markets. When insiders trade in their own company's shares, generally they are in a position to gain abnormal returns than other market participants (Healy and Palepu 2001). Likewise, Seyhun (1988) has investigated the information content of insider trading in the US by analyzing 60,000 open market purchases of insiders from 1975 to 1981. The study has examined the relation between market movements and aggregate insider trading. The economy-wide factors and firm-specific factors have been found to affect the insider trading behavior. Foster and Viswanathan (1996) by using a multi-period model documented that insiders have different pieces of information and they trade strategically to exploit private information among the market participants. Friederich et al. (2002) have studied the London Stock Exchange by examining the patterns in insiders profit around their trade dates. They found that insiders possess valuable information and they engage in short-term market timing for the profitability of their trades.

Performance of the company and possibility of insider trading have been studied by Pettit and Venkatesh (1995) using CAPM, Fama and French (1993) model and Carhart (1997) four-factor model. The relation between insider trading and stock performance is inspected by using parametric, non-parametric significance tests and cross-sectional regressions. Significant links have been found between longer-term, firm-specific and market-related security performance by classifying firms into different portfolios over 3 yearly intervals. The study also has found that insiders own and use superior information for their trading and exploit others. Ravina and Sapienza (2010) study has found that independent directors earn positive significant abnormal returns when they purchase their company's stock. Research studies have unveiled that firms usually leak forthcoming good news ahead of the formal announcement; but reluctant in leaking bad news until absolutely obligatory (Begley and Fischer 1998; Chambers and Penman 1984; Givoly and Palmon 1982). Previous studies have empirically assessed stock market reactions to insider trading. Seyhun (1986; 1992a)

has documented that abnormal profitability of insider transactions indicate that insiders indeed trade on relevant information before the disclosure of the news to the general public.

In a study conducted on the Toronto Stock Exchange, Chen and Zhao (2005) have revealed that insider sell-call transactions are followed by significant abnormal returns based on the market model for the period from 1995 to 2000. The study by Robbins (2010) in the US with a data set of 81 listed companies in the NASDAQ during 2004 to 2006 has examined the matter with CAPM and Tobit model. The author states that the market effects of an ambiguity in insider trading regulation permit the insiders to withdraw pre-planned trades under SEC Rule 10b5-1 built on inside information. Likewise, Leng and Zhao (2012) have indicated that insiders trade passively around repurchase announcements in accordance with their apparent undervaluation to abuse the long-run unusual stock earnings linked to the events. In addition, Ozkan et al. (2014) have analyzed 10,230 purchase transactions executed in 679 firms by 1,477 directors belonging to the UK during the period from 2000 to 2010. The study has revealed that CEO purchases are more informative than CFO purchases and opportunistic purchases. Furthermore, the study conducted by Braggion and Moore (2013) in the UK has investigated directors trading behavior over the period 1890 to 1909. They have concluded that comparatively there are few cases of directors who exploit their informational advantage when they sell their own firm's shares.

By using Vector Auto Regressions (VAR), Abraham and Harrington (2013) have found that the transaction costs are maximum during the periods of informed sales. Moreover, the authors have found that the direction of stock movement is more informative for the short sellers. Consequently, Lei and Wang (2014) have analyzed Securities Exchange Commission (SEC) filings and noted that insiders buy more before the positive announcement and sell more before the negative announcement.

Gangopadhyay et al. (2014) by using the SEC insider trading filings from 1986 to 2009 have examined the informativeness of insider transactions. Their evidence is consistent with information based firm-specific return volatility. Cheng and Leung (2008) study from Hong Kong stock exchange has considered insider trading data

from 1993 to 2000 and found that there are notable insider purchases before the announcements of good earnings and dividend news; and significant insider sale before bad earnings and dividend news. Clarke et al. (2001) have considered the cancelled and completed Seasoned Equity Offerings (SEO) from 1984 to 1996 of NYSE, AMEX or NASDAQ exchanges to find the possibility of abnormal returns of SEO and insider trading. They have noted that market is inefficient as it fails to capture the negative information in the announcement of SEO and insider trading.

The study of Fidrmuc et al. (2006) from the UK has analyzed the market reaction to insider transactions and its relationship on firm's ownership. They have found that speedy reporting of insider transactions during the mergers and acquisitions and CEO replacements contain less information. Some of the studies on insider trading have documented that insiders purchase shares when the prices fall and sell after the price raise (Seyhun 1998). By employing insider trading data from US SEC, Fische and Robe (2004) have analyzed the insider trades and stock brokers trades. They have found that illegal insider trading had a negative impact on market liquidity and market makers make use of asymmetric information and mimic insiders' trades of NASDAQ stocks.

Penman (1985) by considering the data from 1968 to 1973 of the Wall Street Journal and University of Chicago's Centre for Research in Security Prices (CRSP) daily returns file has opined that insider trading is viewed as a signal of management's assessment of firm's prospects and its information content is compared to that in management's earnings forecasts. These forecasts are explicit statements of management's assessments. The study of John and Mishra (1990) has examined insider trading and price reactions around the corporate announcements by using signaling models and Tobin's q ratio in the US market by considering the SEC data. Their research has evidenced that corporate insiders strategically utilize the corporate announcements in dealing with a less informed market. On the contrary, Cohen et al. (2012) have employed an empirical strategy to decode insider information and found that institutional investors mimic opportunistic insider's trades as they have the predictive ability of firm's announcements whereas routine trades do not.

The corporate insiders earn profits from stock trading does not surprise most financial economists, but outsiders earning abnormal returns by using publicly available insider trading data constitutes a serious exception to stock market efficiency (Rozeff and Zaman 1988). In the similar line, Lin and Howe (1990) study has examined the profitability of insider trading in firms whose securities trade in the Over the Counter (OTC) market. They have found that insiders close to the firm trade more on private information and there is a possibility to prohibit outsiders from mimicking the insider trades. By using event study, Koski and Michaely (2000) have investigated the effect of information asymmetry on liquidity and prices by focusing on NYSE listed companies. They have found that informativeness on purchase trades are stronger than sale trades. The study conducted in Australian Stock exchange by Frino et al. (2007) by considering the data from January 1992 to December 2001, has examined the determinants of price impact on block trades and found that liquidity is the major driver of price impact.

Givoly and Palmon (1985) and Healy and Palepu (2001) mention that insider trades have superior information which can earn abnormal returns. Further, MacKinlay (1997), Binder (1998) and others have analyzed statistical problems in event studies in a wide range of settings and their solutions in the estimation of abnormal returns. A most recent study by Cellier et al. (2015) have documented that in four European countries on the information content of Corporate Social Responsibility (CSR) ratings by using event study methodology found that CSR announcements significantly influence the trading volume of the securities. The literature also believes that insider sales convey negative information to the market.

The reviews in this section indicate that insider trading contains price sensitive information which may signal future market movements. For example, the tendency of insiders to buy ahead of the good news and sell ahead of bad news lead to market movements. Further, different categories of insiders' trades convey different degrees of information to the market.

2.4 INSIDER TRADING AND STOCK MARKET CRASHES

The literature presented here is of corporate insider trading behavior during and after the market crash or rally. The research of Marin and Olivier (2008) by using the linear probability model, Logit model, and Probit model, has noted that insider sales are more prior to the market crash and insider purchases are more prior to the rally in the market. Further, insiders' trade over a year's time, very well ahead of crash or rally and limit their transaction very close to the crash or rally. By analyzing reported insider trades with CAPM, Fama and French (1993), and Carhart (1997) four-factor model, Leslie et al. (2003) have estimated returns earned by insiders by focusing on the informativeness of their trades and stated that insiders purchase small and value firm stocks and sell growth firm stocks.

The insider trading information has a substantial demand because it increases the insider's ability to time the market and gain profits (Lakonishok and Lee 2001). The study also finds the evidence that insiders sell more prior to the market crash and purchase more soon after the market crash. The aggregate insider trading predicts extremely accurate future market returns a year ahead and is intense for insiders who have a substantial information advantage (Seyhun 2000). The study of Van Geyt et al. (2013) has shown that insiders earn excess returns during the financial crisis than during the normal trading. On the other hand, Fidrmuc et al. (2013) study shows that price informativeness is positively associated with excess returns surrounding insider purchase announcements.

The researchers like Seyhun (1986) and Rozeff and Zaman (1988) have studied whether outsiders can profit by utilizing the publicly available data concerning insider trading once it is reported to SEC. They have found that outsiders can earn abnormal returns by using publicly available insider trading data. Gu and Li (2012) who examined the relation between insider trading and corporate information transparency, have found a negative relationship between information transparency and stock price reaction to news of insider trading, which suggests that increase in information transparency reduces the insiders' private information. Their study provides evidence consistent with firm's transparency-enhancing activities decreasing information

asymmetry between insiders' and investors by revealing insiders' private information to investors promptly.

By estimating logit model, Korczak et al. (2010) have studied the insider trading in the UK from 1999 to 2002 and documented that insiders limit their trading ahead of bad news and decision of insiders to buy are strategically driven. The study by Wang and Wang (2010) has documented that the market makers can very well observe signals and bringing a signal can help the stock market to reveal more information, but once it is signaled, it may not further improve market efficiency. Olsen and Zaman (2013) have tested the pattern in the earnings announcements of firms and found that insiders buy less when the earnings are upwards in the market and found that there exists trading pattern based on the past returns. With Fama and French (1993) three-factor and Carhart (1997) four-factor model, Chen et al. (2014) have postulated that succeeding OMR announcements are made by company's insiders prior to long-term financial performance of the firm which signals informativeness.

Insiders do not sell on negative information because of the high regulatory and litigation risk than insider purchases; as insiders may be caught with an evidence of foreknowledge in the share price drop (Cheng and Lo 2006). Rogers (2008) has found that insiders provide high-quality disclosures ahead of their sales than what they provide in the absence of trading. By considering the net buying and net selling of insider transactions from US SEC data, Goukasian and Zhang (2016) have established a common pattern of under reaction to information contained in preceding insider trading activity and found that it is common among return anomalies. Cohen et al. (2012) have documented that the majority of informed opportunistic traders are local, non-executive insiders from geographically strenuous and poorly controlled companies. These insiders are likely to have SEC prosecution action carried against them. To avoid such instances, insiders lessen trading, following waves of SEC insider trading enforcement. There is no unanimity in the findings of earlier studies about whether outsiders can profit by utilizing the publicly available data concerning insider trading once it is reported to SEC (Rozeff and Zaman 1988).

Reviews show that insider trading contains significant information about the possibility of future market crash or rally. Insiders strategically buy well ahead of the good news and sell before bad news before the ordinary investors start showing interest in those stocks. Further, insiders also have a tendency of not actively trading very close to the crash or rally in the stock prices.

2.5 INDIAN SCENARIO

The studies relevant to Indian scenario in terms of insider trading are reviewed in this section. Most insider trading research is concentrated in developed markets, particularly the US market, and provides little insight into emerging markets with distinct institutional context and governance structure. The enforcement of insider trading regulations is not so strict in India when compared to that of US (Beny, 2005). The insider trading with UPSI will affect the fairness and efficiency of the stock market, and thus give out a potentially serious and complicated regulatory challenge.

Jain and Sunderman (2014) have applied event study methodology and regression analysis to the data set of C from 1996 to 2010. The study has analyzed the impact of insider trades on stock prices and examined that insider trading took place in industry mergers prior to the announcements. They have found strong proof of insider trading during industry mergers and mergers during recessions. On the other hand, the study of Khanna and Palepu (2000) with a section of private sector listed firms since 1993 has measured the market value of the firm by Tobin's q and found that there is a positive effect of insider trading on firm value. Similarly, Sarkar and Sarkar (2000) with a sample of 1567 manufacturing firms from 1995 to 1996 have measured the market value of the firm by book to market value ratio and Tobin's q and examined that insiders increase firm value beyond ownership of 25 percent. In addition, Douma et al. (2006); Pattanayak (2008) evidenced that private sector manufacturing firms market value and return on assets has a linear relationship between insider shareholding and firm performance.

Earlier studies on Fama and French (1993) three-factor model and Carhart (1997) four-factor model in the Indian context are contradictory to one another stating that

momentum factor has greater influence in estimating the abnormal return than Fama and French (1993) three-factor and CAPM. It may be because of the small sample size or the period considered by the prior studies. Emerging markets like India have a paucity of data and higher information asymmetry (Chauhan et al. 2016).

From the review of the extant literature, it is clear that a close examination of the role of the insider trades is very much essential. It is also evident that there is an apparent dearth of empirical studies on this issue on emerging markets in general, and an important emerging market like India in particular (Chauhan et al. 2014). Findings of the studies are also dependent on the nature of the insider trading regulations which is different in different countries. Therefore, a comprehensive study on insider trading on Indian stock market is very much necessary both from the regulatory as well as ordinary investors' point of view.

CHAPTER 3

DETERMINANTS OF LEGAL INSIDER TRADING

3.1 INTRODUCTION

The first objective of the study is to identify the determinants of insider trading and check the possibility of forecasting the direction of future insider transactions. Insider trading may not be random, it could be heavily concentrated in particular categories of companies and follow a specific pattern. As documented by Piotroski and Roulstone (2005), the insiders trade based on stock misvaluation which infers that insiders often act like arbitrageurs, take advantage of valuation errors arising from outsiders' inferior valuation models and biased judgments. As evidenced by Rozeff and Zaman (1998), insiders overreact and purchase value stocks and sell growth stocks, whereas outside investors undervalue the value stocks and overvalue the growth stocks.

Insiders have an advantage of superior information about their company's earnings potential and growth prospects than outsiders, which may affect the share prices positively or negatively (Seyhun, 1988). It makes the stock prices to be informationally efficient as documented by Meulbroek (1992) by employing the illegal insider trading data from the US stock market. Whereas, Fishman and Hagerty (1992) have shown that in some circumstances, insider trading may also result in less efficient stock prices. They also noted that disclosure of insiders information through SEC Rule 10b-5 would eliminate insiders incentives. Insider trading affects price discovery differently than outsider trading as shown by Chakravarty and McConnell (1999) by finding a positive correlation between insiders trading and share price changes. It is also considered that emerging stock markets are substantially volatile than the developed markets irrespective of the economic fundamentals and high market volatility; it has been found to be associated with more insider trading (Leland, 1992; Du and Wei, 2004).

It is important for the regulators to understand the strategies followed by the insiders which could help them to formulate the regulations accordingly. The extent of insider

trading activities in the stock market differs with the extent of financial disclosures, the economy and culture of different countries (Baiman and Verrecchia, 1996). There is a significant body of literature which has analyzed the insider trading activities which are largely focused on developed markets, and the results may not be same for emerging markets (Cheuk et al., 2006). The study of insider trading in India could be informative because it is an important emerging market.

In line with Rozeff and Zaman, (1998), the study identifies the determinants of insider purchases and sales based on the company characteristics. The study incorporates all the disclosures made by the insiders to the BSE under Securities Exchange Board of India (SEBI) (Prohibition of Insider Trading) Regulations, 1992. For this purpose, the study creates variables to mimic the Fama and French (1993) and Carhart (1997) 4-factor asset pricing model. Further, the study uses variables relating to different regulatory requirements and variables derived from the trading related information in the study. Logistic regression approach is used to identify the determinants of insider trading. Empirical results confirm that there is a consistently increasing trend in the total number of transactions from the beginning to the end of the study period.

3.2 DATA AND METHODOLOGY

The study collects data from two sources viz. BSE and CMIE Prowess database. End of the financial year-wise data on the Market Capitalization (MC) and Book Value (BV) per share of all listed companies of BSE is collected from the CMIE Prowess database for the eight-year study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded for that year.

The insider transactions are subject to the disclosure requirements of SEBI (Prohibition of Insider Trading) Regulations, 1992. It comprises insider transactions of all the listed companies of BSE from 1st April 2007 to 31st March 2015 reported to BSE. There is a total volume of 1,78,952 insider transactions during the period in question. The data set comprises scrip code, scrip name, the name of the acquirer/seller, date of the transaction, purchase/sale, mode of purchase/sale, shares

traded quantity, the percentage of shares traded, the holding after the transaction, percentage holding after transaction, SEBI regulation under which the transaction is reported and date on which the transaction is reported to the exchange. Under SEBI regulation, all insider transactions are classified under three heads. For example, 13(4) represents the details of change in shareholding by Director or Officer of a listed company and his/her dependents; 13(4)A represents the details of change in shareholding or voting rights held by Director or Officer and his/her dependents or Promoter or Person who is part of Promoter Group of a listed company and Regulation 13(6) represents the details of shares or voting rights held by Director or Officer and his/her dependents or Promoter or Person who is part of Promoter Group of a listed company, or positions taken in derivatives by Director or Officer of a listed company and his dependents.

The study confines to the insider transactions reported under open market purchases and sales. Insider transactions reported under Employee Stock Option Plan (ESOP), off-market, and other categories are not included in the study considering that such transactions are bound by certain contractual obligations. Further, several transactions reported under open market transactions do not have information on transaction date and whether a transaction is a purchase or sale. The study eliminates such transactions with missing information from the analysis. The final insider data set consists of 97,850 open-market insider transactions. While matching the insider transaction data set with the information collected from CMIE Prowess database, information on market capitalization, book value per share, momentum, and PE Ratio were missing for several companies. There are about 11,377 transactions with missing information which are not considered for the study and final data set consists of 80,588 open market transactions with complete information on all variables required for the study.

Taking a cue from Fama and French (1993) and Carhart (1997) multi-factor asset pricing models, the present study creates variables based on size (Market capitalization), BE/ME (Ratio of Book Value to Market Value of Equity) and momentum (past one year return) categories. For example, the study constructs the size category using breakpoint of up to bottom 30% as 'small', the middle 30% to 70% as 'medium' and above 70% as 'big' category. Using same break points, based

on BE/ME ratio, the study creates three categories as ‘low’, ‘medium’ and ‘high’ BE/ME ratio categories. Further, the study identifies momentum based on the past one year return and uses this information to create ‘low momentum’, ‘medium momentum’ and ‘high momentum’ category using same breakpoints as in the case of size and BE/ME categories. Finally, based on the price-to-earnings (PE) ratio of the firm, the study classifies the companies as ‘high PE’, ‘medium PE’ and ‘low PE’ using the same break points. The present study uses these variables as categorical variables in the logistic regression.

The study uses the logistic regression framework to find the determinants of the insider purchases and sales (Lakonishok and Lee, 2001; Seyhun, 1992) and attempts to predict the future insider transactions. The study estimates the following logistic regression equation to examine the insider trading behavior:

$$\begin{aligned}
 \text{Logit}(P_{it}) &= \text{Log}[P_{it}/1 - P_{it}] \\
 &= \alpha_0 + \beta_1 \text{NSTQ}_{it} + \beta_2 \text{Year Dummy}_{it} + \beta_3 \text{Regulation}_{it} \\
 &+ \beta_4 \text{Size}_{it} + \beta_5 \text{BEME}_{it} + \beta_6 \text{Momentum}_{it} + \beta_7 \text{PE Ratio}_{it} \\
 &+ \varepsilon_i \quad (3.1)
 \end{aligned}$$

where P_{it} is the probability of an insider purchase/sale in stock i at time t which takes value of 1 for insider purchases and 0 for sales. NSTQ_{it} is the Number of Shares Traded Quantity in stock i at time t . To identify the variations in the insider transactions over time, the study includes *year dummy* _{it} from 2007 to 2014 as categorical variables with the year 2007 as the base category. *Regulation* _{it} is the SEBI Insider Regulation which identifies different categories of the insiders in stock i at time t . It is a categorical variable and regulation 13(4) is the base category. *Size* _{it} , *BEME* _{it} , *Momentum* _{it} , and *PE* _{it} are categorical variables representing size, BE/ME ratio, momentum, and PE ratio of the firm. There are three classifications in each of these four variables and lowest category in size, BE/ME ratio, momentum, and PE ratio are considered as the base category. Out of total 80,588 transactions, the study estimates logistic regression model using 74,703 transactions and uses remaining 5,885 transactions for making out-of-sample prediction.

In line with the previous literature, the research has employed four categorical variables to capture the insider trading behavior across the size based on market capitalization; BE/ME (Book Value to Market Value of Equity Ratio), momentum and; growth and value portfolios based on PE ratio. (Lakonishok et al., 1994; Rozeff and Zaman, 1998).

3.3 EMPIRICAL RESULTS

The financial year wise² insider purchase, sale and a total number of transactions are presented in Table 3.1 for the study period from April 2007 to March 2015. The research finds a consistently increasing trend in the total number of transactions from the beginning to the end of the study period. The number of transactions is very less in the initial two years, i.e., 2007-08 and 2008-09 and it is important to note that there is a substantial jump in the insider transactions in the year 2009-10. The study finds a sudden increase in reported insider transactions because in November 2008, SEBI amended its regulations by making it an obligation on the part of insiders to disclose their holdings to the stock exchange. From 2008-09 to 2013-14, the percentage of buy transactions has always been higher than the sale transactions. However, 2014-15 is an exception as sale transactions exceed the purchase transactions. The financial year 2011-12 records highest purchase percentage of 74% and 2014-15 records the highest sale percentage of 57%. The overall record of insider transaction shows that the number of insider purchases are 60433 (62%) and sales are 37417 (38%).

Mean and variance of the variables used in the logistic regression is shown in Table 3.2 for the entire study period. Mean values of the number of shares traded by the insiders and holding after transaction show that insiders as a group trade in large quantities. BE/ME is less than one indicates that on an average, the market value of the share is more than the book value and the result is on the expected lines. Further, the average momentum as represented by the past one year return is also on the higher side at 64%. Average PE ratio of almost 66 also corroborates the findings of the momentum. Based on variance, BE/ME is more volatile than the momentum variable.

²In India, financial year is different from calendar year. Financial year starts from 1st April to 31st March. For example, financial year 2014-15 means it is from 1st April 2014 to 31st March 2015.

The pattern of insider trading may vary based on size, book to market equity and momentum categories. For the purpose of comparison, Figure from 3.1 to 3.3 report the insider purchase and sale transactions based on size, BE/ME and momentum categories. As shown in Figure 3.1, insider purchase and sale transactions are more in companies with large market capitalization and followed by medium market capitalization group. There are very few transactions in the small market capitalization companies. Over the years, a marginal increase in the insider transactions in medium market capitalization companies can be seen from the figure.

Insider trading pattern based on BE/ME category as seen in Figure 3.2 shows that there is a concentration of insider trading in the medium BE/ME category companies and followed by low BE/ME and high BE/ME category companies. However, bifurcation of insider transactions into purchase and sale transactions presents a slightly different picture. Insider purchases are more in medium BE/ME category companies, whereas sale is more in low BE/ME category companies. Overall, there is an increasing trend in the insider trading in the low BE/ME category during the study period.

Insider trading may depend on the momentum in the return and to explore that insider transactions in high, medium and low momentum as shown in Figure 3.3. Unlike insider trading in size and BE/ME category, momentum category does not show any clear pattern and there is variation across different years. Insiders purchases are more in low momentum category in the year 2011-12 in comparison with medium and high momentum category companies. However, in years 2012-13 and 2013-14, insiders purchases are more or less equally distributed across all three momentum categories. Insider sale transactions present a clear picture as they are concentrated more in high momentum category companies in many of the years.

The present study analyses the determinants of insider trading using logistic regression framework and the result is presented in Table 3.3. In the logistic regression, the dependent variable is defined as 1 for purchase and 0 for sale. The NSTQ with an odds ratio of one indicate that there is one to one positive relationship between NSTQ variable and the dependent variable, a higher NSTQ lead to insiders

purchasing the stock. There is a consistently upward trend in the number of insider transactions and to take this effect into account, the year dummies are included in the model from 2007 to 2014 as categorical variables. The odds ratio of less than one in the initial years, i.e., 2008 to 2010 shows that there are lower chances of insiders purchasing in these years when compared with the base year, i.e., 2007. From the year 2011 to 2014 the odds ratio of more than one indicates that there are higher chances of buy in these years when compared with the base year. Regarding regulation, section 13(4)A has lower odds of purchase, whereas the Regulation 13(6) has higher odds of purchase concerning the base category, i.e., regulation 13(4). It shows that insiders like promoter or person who is part of the promoter group of a listed company have lesser odds of purchase than the director or officer of a listed company and his/her dependents. The size variable has three categories viz. small, medium and big. The odds ratio of less than one for medium size and more than one for big size categories shows that the chances of buy occurring are less in the medium size category firms and high in the big size category firms when compared with the baseline category, small firms. It is contrary to the findings of Jeng et al. (2003) who evidenced that insiders disproportionately purchase the small stocks and Seyhun (1986) who found that insiders tend to buy heavily in small companies. In the same manner, in the BE/ME category, medium and high BE/ME firms have an odds ratio of less than one, implying that the possibility of buy occurring is less in these two categories of firms when compared with the baseline category i.e., low BE/ME category. This finding is similar to the results of Piotroski and Roulstone (2005), who found that insider trading is concentrated in larger firms and growth firms (i.e., low BE/ME firms). In the momentum category, the odds ratio of more than one in the case of medium and high momentum category firms show that the possibility of buy occurring is more in these two categories compared to the baseline category, i.e., low momentum category firms. Indian insiders purchase more in medium and high momentum stocks. It is in conformity with the findings of Sehgal and Balakrishnan (2002) and Chui et al. (2010) who have documented the existence of momentum phenomena in the Indian markets. In the same manner, in the PE ratio category, medium PE and low PE firm categories have an odds ratio of more than one, indicating that the possibilities of buy occurring are more in these two categories compared with the baseline category, i.e.,

high PE firms category. It is in line with the findings of Rozeff and Zaman, (1998) and Jenter (2005), Jeng et al. (2003), who have documented that insiders rationally choose to sell the growth stocks and buy the value stocks. Indian corporate insiders purchase more in a value stocks in comparison to the growth stocks.

The present study assesses the predictive power of the logistic regression model within the sample as well as out of sample and result is presented in Table 3.4. Insider transactions from 1st April 2007 to 31st December 2014 are used to estimate the model and out of sample forecasting is generated based on the insider transactions from 1st January 2015 to 31st March 2015. The model has correctly predicted 85.6% of purchase transactions and 54.2% of sale transactions within the sample. Overall, the model has predicted 74.2% of all transactions within the sample. Out of sample prediction statistics shows that 74.6% of purchase transactions and 68.5% of sale transactions are predicted correctly. Overall, 71.5% of total transactions are predicted correctly. There is a marginal drop in the predictive power of the model in out of sample prediction compared to within sample.

3.4 CONCLUSION

An effort is made to identify the determinants of insider trading and forecast the future insider transactions in Indian stock market. The study uses logistic regression to analyze the insider trading data from BSE. The study classifies the companies into various categories and explores the insider trading pattern across these categories. Findings of the study confirm that the insiders' seem to have a preference for large market capitalization companies, low BE/ME companies and companies with momentum while purchasing the stocks. Indian corporate insiders purchase more in value stocks in comparison with the growth stocks.

The findings of the study could help the individual investors to understand the dynamics of the insider trades since the data used in this study is in the public domain. Further, the results also can be helpful to the securities market regulator, SEBI and policy makers to understand the insider trading pattern across various stock categories and devise the regulations accordingly.

Table 3.1: Total number of insider purchase and sale transactions from April 2007 to March 2015

Financial Year	Total No. of transactions (A=B+C)	No. of purchase transactions (A)	No. of sale transactions (B)
2007-08	49	27 (55 %)	22 (45 %)
2008-09	104	87 (84 %)	17 (16 %)
2009-10	7391	4480 (61 %)	2911 (39 %)
2010-11	10045	6162 (61 %)	3883 (39 %)
2011-12	16188	11937 (74 %)	4251 (26 %)
2012-13	19942	12565 (63 %)	7377 (37 %)
2013-14	24730	16873 (68 %)	7857 (32 %)
2014-15	19401	8302 (43 %)	11099 (57 %)
Total	97850	60433 (62 %)	37417 (38 %)

Note: Disclosures made to BSE under the SEBI (Prohibition of Insider Trading) Regulations, 1992.

Table 3.2: Descriptive Statistics on insiders trade and independent variables during April 2007 to March 2015

	N	Mean	Variance
No of Shares Traded (Quantity)	97850	286046.98	2.6804E
Holding After Transaction (Quantity)	92934	14371078.45	1.57E
Market Capitalization	91420	137789.26	1.95E
BEME	91420	0.70	3708.56
Momentum	91420	0.64	123.94
PE Ratio	95390	65.96	237038.5

Note: The units of measurement of variables are in terms of a number of open-market insider transactions that took place for the period April 2007 to March 2015.

Table 3.3: Results of the Logistic Regression Model

Variable	Parameter Estimate	Wald	Odds Ratio Exp(B)
NSTQ	0.000*** (.000)	49.728	1.000
2007		3719.622	
2008	-0.244 (.483)	.255	.784
2009	-0.161 (.412)	.152	.852
2010	-0.006 (.039)	.023	.994
2011	0.067*** (.031)	4.561	1.069
2012	1.540*** (.030)	2550.707	4.664
2013	0.705*** (.026)	756.133	2.024
2014	0.922*** (.024)	1433.088	2.515
Regulation 13(4)		1088.413	
Regulation 13(4A)	-0.455*** (.021)	492.278	.635
Regulation 13(6)	0.581*** (.029)	408.705	1.789
Small		24.715	
Medium	-0.274*** (.071)	14.820	.761
Big	.057*** (.025)	5.151	1.059
Low BE/ME		2825.090	
Medium BE/ME	-1.661*** (.044)	1439.136	.190
High BE/ME	-.783*** (.042)	354.746	.457
Low Momentum		4148.620	
Medium Momentum	1.198*** (.022)	2983.175	3.314
High Momentum	1.068*** (.022)	2342.305	2.910

High PE		1489.889	
Medium PE	.881*** (.024)	1325.306	2.413
Low PE	.617*** (.020)	908.503	1.854
Constant	.041*** (.048)	.709	1.041

Note: The insider trading transactions are merged with the BSE listed companies on a yearly basis from 2007 to 2015. The study used five categorical variables to capture the insider trading behavior across the growth and value portfolios i.e. year dummy, size based on market capitalization; BE/ME (Book Value to Market Value of Equity Ratio), momentum and PE (Price Earnings) ratio.

$$\begin{aligned}
 \text{Logit}(P_{it}) &= \text{Log}[P_{it}/1 - P_{it}] \\
 &= \alpha_0 + \beta_1 \text{NSTQ}_{it} + \beta_2 \text{Year Dummy}_{it} + \beta_3 \text{Regulation}_{it} \\
 &\quad + \beta_4 \text{Size}_{it} + \beta_5 \text{BEME}_{it} + \beta_6 \text{Momentum}_{it} + \beta_7 \text{PE Ratio}_{it} \\
 &\quad + \varepsilon_i
 \end{aligned}$$

NSTQ is the continuous variable. *Year dummy*, *Regulation*, *Size*, *BEME*, *Momentum*, *PE Ratio_{it}* are the categorical variables used in the equation. Where, P_{it} is the probability of an insider purchase/sale in stock i at time t , NSTQ_{it} is the Number of Shares Traded Quantity in stock i at time t , *year dummy_{it}* from 2007 to 2015 are the dummy variables, *Regulation_{it}* is the SEBI Insider Regulation 13(4) - Details of change in shareholding by Director or Officer of a listed company and his dependents; 13 (4)A - Details of change in shareholding or voting rights held by Director or Officer and his dependents or Promoter or Person who is part of Promoter Group of a listed company; Regulation 13 (6) - Details of shares or voting rights held by Director or Officer and his dependents or Promoter or Person who is part of Promoter Group of a listed company, or positions taken in derivatives by Director or Officer of a listed company and his dependents at time t . *Size_{it}* category comprises Small, Medium, Big; *BEME_{it}* category includes High, Medium, Low; and lastly, *Momentum_{it}* is categorized as high momentum, medium momentum, and low momentum. *PE Ratio_{it}* is High PE, Medium PE and Low PE portfolios derived from the PE ratios. The High PE portfolios are formed by PE ratio with the top 30%, the firms in between 30% to 70% comprise medium PE portfolios and the Low PE portfolios are formed by PE ratio of the bottom 30%.

***Statistically significant at the 5% level. The values in parentheses are a standard error. Model results are with 85659.220 (Log likelihood).

Table 3.4: Prediction of the Logistic Regression Model

		Predicted					
		Selected Cases			Out-of-sample analysis		
		Buy sell code		Percentage Correct	Buy sell code		Percentage Correct
		0	1		0	1	
Buy sell code	0	15861	13400	54.2	1809	833	68.5
	1	7386	43941	85.6	652	1913	74.6
Overall Percentage				74.2			71.5

Figure 3.1: Insider trading behavior in Size category and B S E Sensex from April 2007 to March 2015

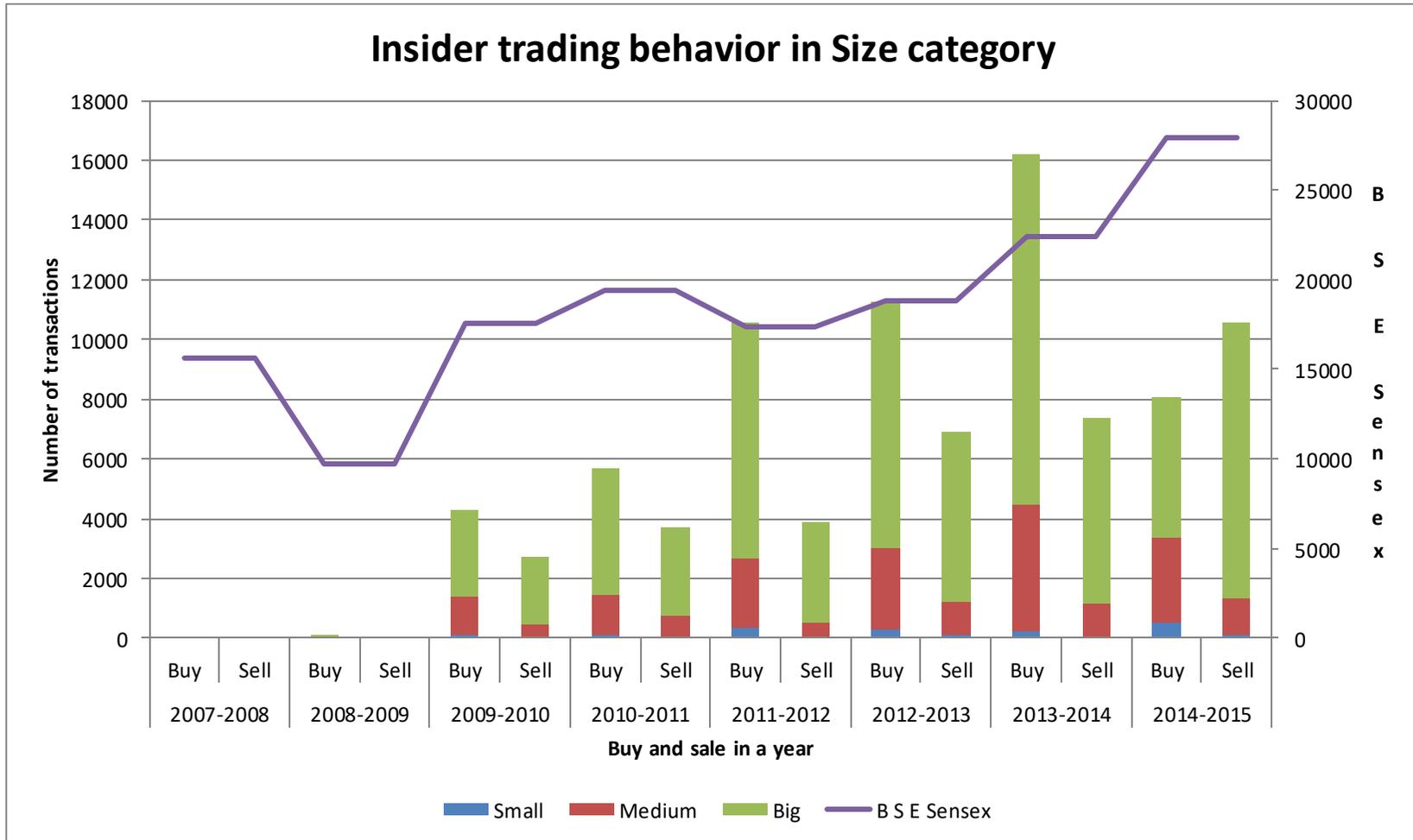


Figure 3.2: Insider trading behavior in BE/ME category and B S E Sensex from April 2007 to March 2015

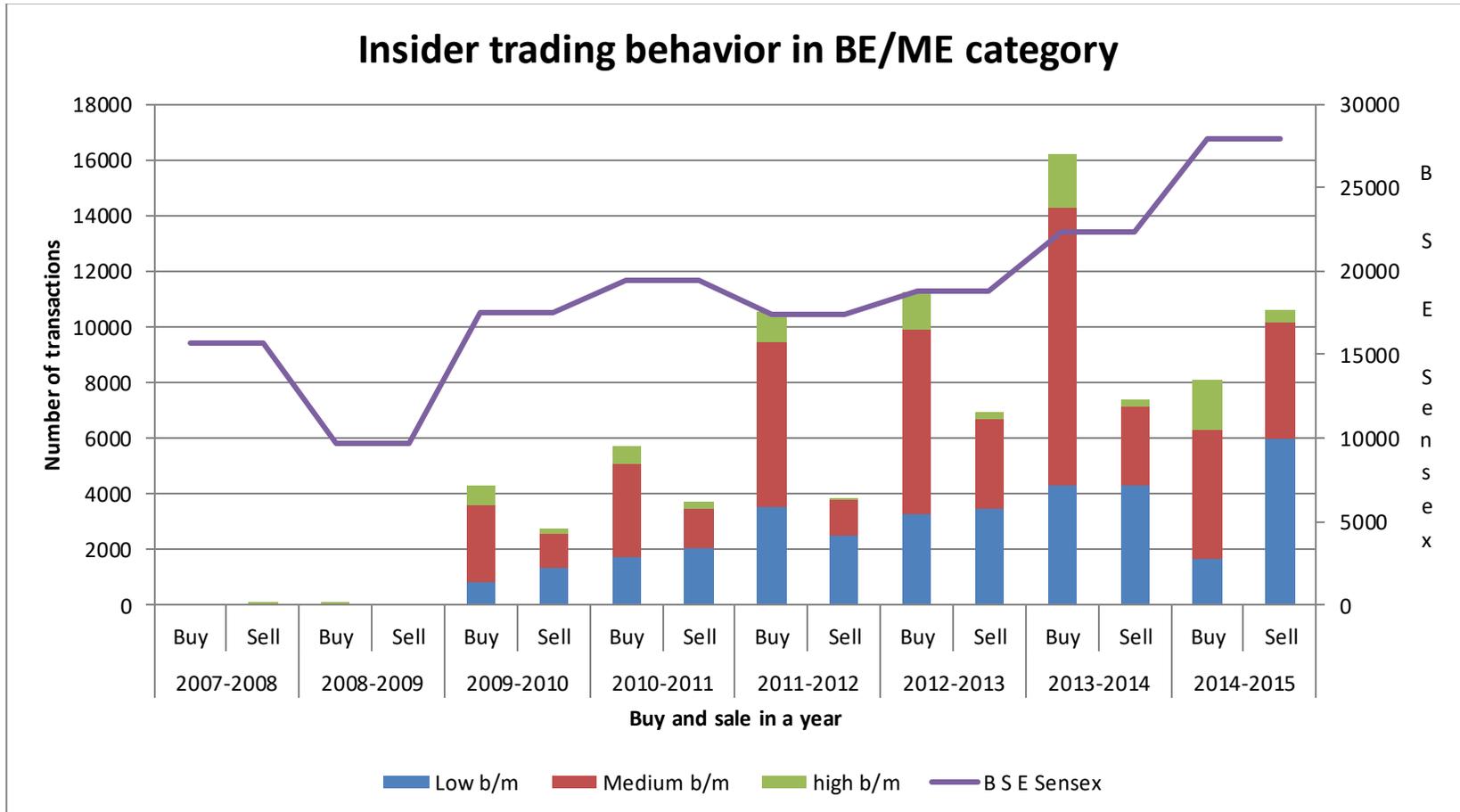
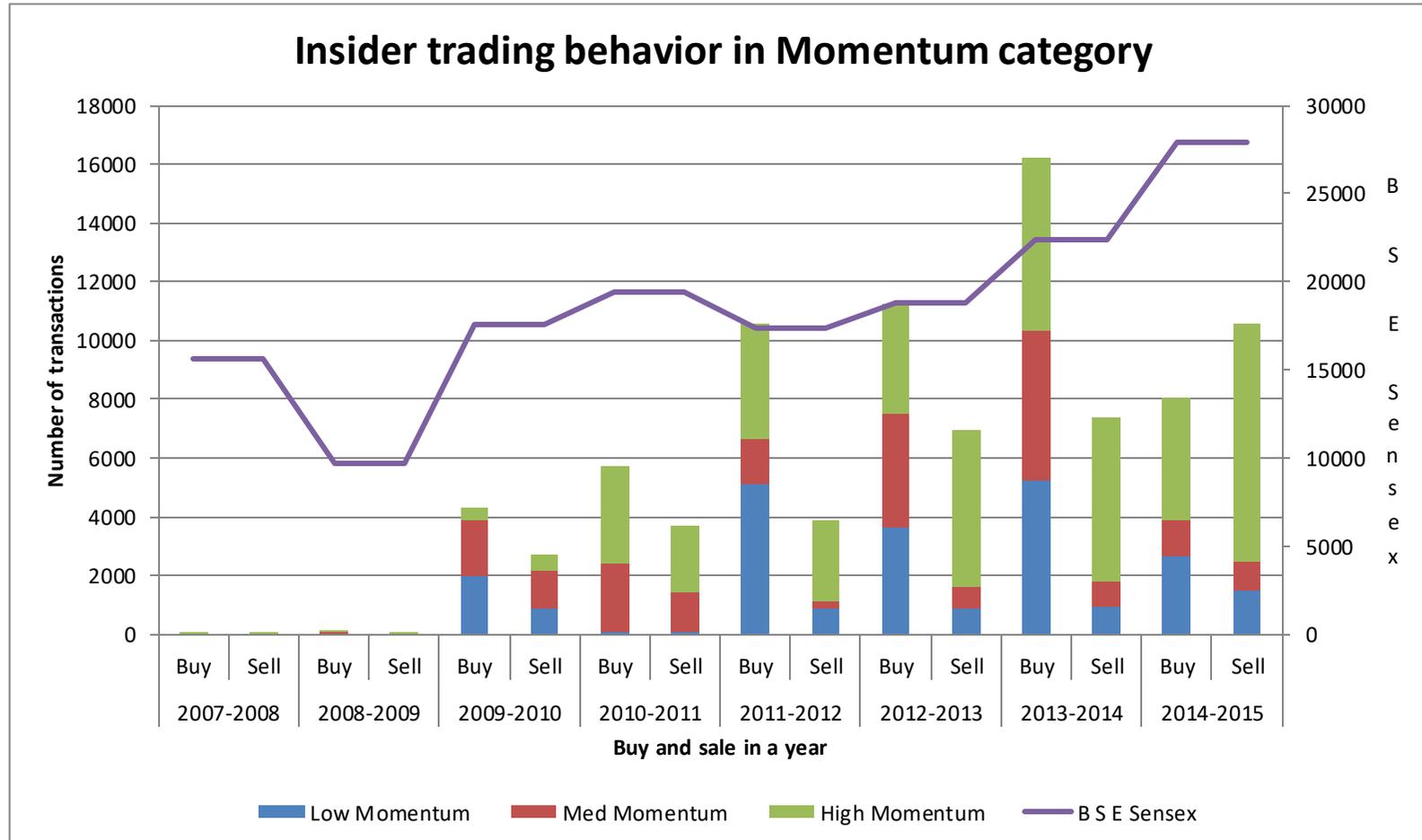


Figure 3.3: Insider trading behavior in Momentum category and B S E Sensex from April 2007 to March 2015



CHAPTER 4

INSIDER TRADING AND ABNORMAL STOCK RETURNS

4.1 INTRODUCTION

Insider trading has been subject to regulation since the nineteenth century. In the light of fast development of insider trading law, impact of the insider trading on information efficiency has received increased attention of regulators, researchers, and investors. Information is the key to distinctive rewards for investment in securities markets. As corporate insiders are thought to have information which is unavailable to the general public, imparts them an advantage in investment activities (Baesel and Stein 1979). Previous research has found that insider trading yields an excess return which was attributed to the misuse of inside information, focal to the inference that insiders own and use superior information for their trading (Givoly and Palmon, 1985).

Trading by key managerial personnel, directors, and promoters, who are widely called insiders, receive global attention in the financial community. Academicians are focused on some exceptional information insiders hold, as well as in the abnormal profits they earn (Jaffe 1974). Corporate insiders benefiting from insider trading do not surprise financial economists, but the possibility of outsiders earning excess return by using publicly accessible insider trading data comprises a serious anomaly to stock market efficiency (Rozeff and Zaman 1988). In the last two decades, many studies have found that insiders earn abnormal returns when they trade in their own company's shares.

Market participants acknowledge that the legal insider trading data reported to the stock exchanges is a rich source of information on the future movement of stock prices. Insider trading is generally presumed to release the private information to the market regarding the future profitability of the company. As a result, share prices move towards the fundamental or intrinsic value. When insiders purchase a stock, it conveys positive information about the company, whereas selling conveys negative

information. Therefore, positive abnormal return to insider purchases and negative abnormal return to the insider selling is expected. However, empirical findings are mixed and make it an interesting empirical question to investigate on the impact of insider trading on the future stock return of the company.

There are very few relevant studies on insider trading in emerging markets like India when compared with the studies in developed markets. The findings of the study can shed light on the matter that whether insiders can earn an abnormal return or not. It is equally important for the regulators to see the strategies pursued by the insiders which may help them to devise the regulations accordingly. This study tries to elicit the insider trading and abnormal returns by scaling-down to portfolio level based on the insider trades. The present research adopts Fama and French (1993) and Carhart (1997) four-factor model to examine whether Indian corporate insiders earn abnormal return from their transactions. Using a publicly available data set of insider transactions in India, the researcher assesses whether insiders earn an excess return.

4.2 DATA AND METHODOLOGY

The study aims to investigate insider trading in the Indian stock market, and for this purpose, the study chooses the insider trading disclosures made to the BSE. The selection of BSE is based on the fact that more companies are listed in BSE; it includes almost all companies listed on NSE and has much more. The total number of companies listed in BSE is around 5500 compared to around 1800 companies in NSE. The companies listed on the BSE have a total market capitalization of USD 1.64 Trillion as of September 2015³.

The study obtains the financial details of the listed companies of BSE, namely market capitalization, Book Value (BV) per share, shares outstanding from CMIE Prowess database. If the market capitalization or book value of a stock is missing for a particular year, then that stock is ignored for that given year.

All insider transactions analyzed in this study are taken from the disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992. These records

³<http://www.bseindia.com/static/about/introduction.aspx?expandable=0>

include security code, security name, transaction date, mode of buy/sell, the number of shares transacted quantity/percentage, holding after transaction quantity/percentage, regulation, and the date on which the transaction is reported to exchange. There are 1,78,952 insider transactions reported to BSE during the period April 2007 to March 2015. The transactions which do not have information on whether the transaction is purchase or sale are ignored from the study. Further, the study considers only the open market transaction and ignores all other modes of transactions, namely transactions through ESOPs, off-market, inter-se transfer, preferential allotment, etc. Final data set consists of 97,850 open market transactions made by the insiders are considered for the study.

The present research employs a multifactor asset pricing model proposed by Fama and French (1993) and extended by Carhart (1997) to include four-factors to define the stock return variability. The model is specified as follows:

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t \quad (4.1)$$

where, R_{it} is the daily return on stock i at time t , R_{Ft} is the daily interest rate of government dated securities at time t . R_{mt} is the return on a constructed market index⁴ at time t . SMB_{mt} (Small Minus Big) is the return on a portfolio of small stocks minus the return on a portfolio of big stocks. HML_{mt} (High Minus Low) is the return on a portfolio of stocks with a high BE/ME ratio minus the return on a portfolio of stocks with low BE/ME ratio. WML_{mt} (Winners Minus Losers) is the return on the portfolio of stocks with high momentum minus the return on a portfolio of stocks with low momentum. The error term in the regression is represented by ε_t .

The study obtains the book value and market capitalization of all the listed stocks in BSE for the financial-year⁵ end, 31st March of each year. The size category is formed based on market capitalization using breakpoints of the bottom 30% as small (S), middle 40% as medium (M) and top 30% as big (B). Using same breakpoints, the

⁴Index has been constructed for 't' year by dividing the individual company market capitalization with the total market capitalization of 't' year. Value-weights are calculated by the (portfolio weight *log returns). Whereas, daily returns are calculated by Ln of daily closing market capitalization.

⁵ India follows a financial-year system which extends from 1st April to 31st March.

study creates BE/ME and momentum portfolios. The three BE/ME portfolios are low BE/ME, medium BE/ME and high BE/ME. In the same manner, the three portfolios based on momentum are low momentum, medium momentum and high momentum. In total, nine portfolios are created based on size, BE/ME and momentum. This is a slight departure from the original Fama and French (1993) model which has created only two portfolios based on size as small and big. In line with Carhart (1997), the study adds momentum category as an additional variable. The study refrains from creating another category based on liquidity as size and liquidity are highly correlated in the Indian context.

The study uses the nine portfolios to create a total of 27 portfolios based on the interaction among them to create a portfolio of one category which will be free from the influence of other two categories. For example, Small (S), Medium (M) and Big (B) are interacted with the three categories of BE/ME, Low BE/ME (L), Medium BE/ME (M), High BE/ME (H) and three categories of momentum, Low Momentum (LM), Medium Momentum (MM) and High Momentum (HM). This results in the creation of total nine portfolios for small size stocks as S/L/LM, S/L/MM, S/L/HM, S/M/LM, S/M/MM, S/M/HM, S/H/LM, S/H/MM, and S/H/HM. The medium size portfolios are M/L/LM, M/L/MM, M/L/HM, M/M/LM, M/M/MM, M/M/HM, M/H/LM, M/H/MM, and M/H/HM. Finally, the large size portfolios are B/L/LM, B/L/MM, B/L/HM, B/M/LM, B/M/MM, B/M/HM, B/H/LM, B/H/MM, and B/H/HM.

SMB is the simple average difference between nine small size and big size portfolios. This should be largely free from the influence of BE/ME and momentum as both small and big stock portfolios have similar weights of BE/ME and momentum. In the same manner, HML is the simple average difference between nine low BE/ME and high BE/ME portfolios. HML should be largely free from the influence of size and momentum. Finally, WML is the simple average difference between nine high momentum and low momentum portfolios. WML should be free from the influence of size as well as BE/ME as both are more or less equally represented in low and high momentum stocks. Thus, the asset pricing model with excess return on individual stock is dependent variable and excess return on market, SMB, HML and WML are the independent variables provides the basis for calculating the expected return on the

stock. Subtracting the expected return from actual return provides the measure of abnormal return.

The study measures the abnormal return to insider trading by classifying the companies based on various factors. First, the study separately analyses the insider purchase and sale transactions to find possible difference in the performance of the strategies of the insiders. Second, at each company level, at the end of every quarter the net position of the insiders are arrived and classified as either net purchase or sale. Based on this calculation, the study classifies companies into total 10 portfolios. The first portfolio consists of companies with zero net position in the entire year. It means that the insiders have bought and sold the same number of shares or vice versa. Second to fifth portfolios have no purchase transactions; however vary in terms of net sale transactions. For example, in the second portfolio, insiders are net sellers in only one quarter and no net positions in remaining three quarters. In the same manner, third, fourth, fifth portfolio have insider net sale in two, three and four quarter respectively. Portfolios from six to nine represent only purchase transaction and no sale transactions. Difference among these portfolios is in the number of net purchase transactions. For example, in the sixth portfolio, insiders are net buyers in only one quarter and no net positions in remaining three quarters. In the same manner, seventh, eighth, and ninth portfolio have insider net purchases in two, three and four quarters respectively. Finally, the last portfolio consists of the companies in which insiders have both net purchase and net sale transactions in different quarters. The study calculates the abnormal returns to these 10 portfolios for the purpose of comparison. Performance of these portfolios should provide an insight into the profitability of the insider trading in their purchase and sale transactions.

The study further classifies the companies with insider trading based on the standard investment strategies based on size, BE/ME ratio and momentum for insider purchase and sale transactions separately. Taking cue from the asset pricing model, the study classifies the companies based on size into three categories as small, medium and big. Based on BE/ME ratio, companies are classified as low, medium and high BE/ME ratio. Finally, based on momentum, companies are classified as low, medium and high momentum companies. The study compares the performance of these portfolios with

the market performance in similar categories by removing the companies with insider transactions. The comparison portfolios are called as ‘outsider portfolio’ as it excludes the influence of insider transactions. The intercept of the asset pricing models provides the basis for the comparison among the portfolios.

4.3 EMPIRICAL RESULTS

Table 4.1 presents the information on year-wise insider purchase, sale transactions and number of companies in which insiders traded. There are 73 open market transactions from 23 companies in the initial year, i.e., April 2007 to March 2008 to a high of 21,617 open market transactions from 1,171 companies during April 2014 to March 2015. The average number of companies over the 8-year sample period is 790 companies each year, and the open market transactions on an average are 12,232 out of which 7,555 are purchase transactions and 4,677 are sale transactions. Information on the percentage of insider transaction and number of companies under such transaction are shown in the Table 4.2. It is clear from the table that bulk of the insider transaction is around 5% of the shares outstanding of the company.

The study classifies the companies based on the position of the insiders as either net purchase or sale at the end of each quarter. It resulted in the creation of 10 portfolios. Number of companies each of these categories are presented in Table 4.3. Most of the companies fall in the category of a single purchase and a single sale transaction. Number of companies decreases as the number of insiders quarterly net positions as purchase or sale increases. Table 4.4 reduces the number of categories to four, it is clear from the table that number of insider companies with insider purchases far exceeds the companies with insider sale. Overall results presented in the Table 4.3 and 4.4 show that insiders trade decisively, for example, on more number of companies, insiders have taken a clear position as net purchasers or sellers than on companies on which net position is either zero or have made multiple transactions in the opposite direction. Even as net purchasers or sellers, concentration of insider transactions in ‘0 buy- 1 sell’ and ‘1 buy- 0 sell’ portfolio further confirms that insiders are very clear about their trading.

Year-wise abnormal returns to the 10 portfolios is shown in the Table 4.5. Year on year, insider purchase and sale portfolios have shown both positive and negative abnormal return which is quite large as well. However, for the entire study period, insider purchase portfolios have positive abnormal return and sale portfolios have negative abnormal return. Negative abnormal return decreases in the sale portfolios as number of net quarterly sales increases from one to four. Similar pattern is observed in the case of purchase portfolios as well albeit with minor abbreviation in the case of purchase portfolios with three and four net purchase transactions. Portfolios with multiple purchase and sale transactions as well as zero net purchase and sale portfolios also earn negative abnormal return.

The study tests the statistical significance of the negative abnormal return by estimating four-factor asset pricing model with excess return of the insider trading portfolio and excess market return. Therefore, the intercept of the equation may be taken as the measure of abnormal performance. Result of the same is presented in the Table 4.6. Signs of the intercept coefficients confirm the findings of the abnormal return. However, results are statistically significant only in two purchase and sale portfolios and rest of the coefficients are statistically insignificant.

Abnormal returns to insider trading is not just compared among purchase and sale portfolios, it needs to be compared with the broad based market as well. Therefore, insider purchase and sale portfolios are classified based on size, BE/ME ratio and momentum and are compared with similar categories with the rest of the market excluding the impact of insider trading. Table 4.7 presents the results for the insider purchase and sale portfolios and Table 4.8 for the 'outsider portfolios'. Out of nine portfolios, five insider purchase portfolios and four sale portfolios have positive and negative intercept coefficients respectively. All other intercept coefficients are statistically insignificant. Comparison of this result with outsider results presented in Table 4.8 shows that most of the coefficients are statistically insignificant in the case of outsider group. This confirms the information advantage of the insiders over the outsider group.

Performance of the insider trading and outsider group results may vary across different periods. Therefore, entire period is classified into two sub-periods, first sub-period from April 2007 to March 2011 and second sub-period from April 2011 to March 2015. First sub-period covers the financial crisis and recovery, whereas the second sub-period covers the latest period. Table 4.9 presents the results for insiders 'buy only group' and Table 4.10 for the 'sell only group'. Table 4.11 presents the same result for the 'outsider group'. The results of the full period are reflected in the sub-periods as well.

There may be correlation between insider purchase and sale transactions with the future quarterly returns. Table 4.12 presents the result, insider net purchase is associated with positive return for subsequent four quarters in the same stocks. Insider net sales are largely associated with negative returns. However, the first quarter return is an exception.

The empirical investigation is undertaken with the presumption that there is a possibility of insider trading earning abnormal return. Empirical results confirm to a large extent that insiders earn positive abnormal return on purchase transaction and negative abnormal return on sale transaction. However, the broad based market does not seem to earn significant abnormal return across similar categories and time period. Therefore, the null hypothesis 'insider trading does not yield abnormal returns' is rejected. However, it should be noted that there are few categories in the purchase and sale categories which do not show any significant abnormal return.

4.4 CONCLUSION

The study makes an effort to analyse the abnormal returns to insider trading in the Indian stock market for the period extending from April 2007 to March 2017. Insider transactions are classified into several portfolios based on the intensity of purchase, sale, and standard strategies of investment based on size, BE/ME ratio, and momentum. Further, study period is classified into two phases covering financial crisis and the post recovery period. The study calculates the abnormal return to insider purchase and sale portfolios and compares it with the 'outsider group' in similar

categories. Abnormal return calculation is based on a multifactor asset pricing model taking cue from Fama and French (1993) and Carhart (1997) asset pricing models.

Empirical results of the study confirm that insider purchase portfolios earn positive abnormal return and sale portfolios earn negative abnormal return. Outsider groups do not seem to earn any abnormal return during the same period. Further, insider purchase and sale portfolios with single net purchase or sale position seem to earn higher positive and negative abnormal return respectively. Concentration of the transactions in this category confirms that insiders have decisive information about the company and trade accordingly. Finally, correlation between insider net purchase and future quarterly return is positive, whereas sale is negative. It once again confirms the information advantage of the insiders over outsiders. Findings of the study should be of interest to the regulators, analysts, and investors.

Table 4.1: Overall characteristics of insider transactions from April, 2007 to March, 2015

Year	No. of purchase transactions (A)	No. of sale transactions (B)	Total No. of transactions (C=A+B)	Net buy quantity (D=E-F)	Shares purchased quantity (E)	Shares sold quantity (F)	No. of companies (G)
2007-08	27	22	49	-50,27,735	1,23,85,365	1,74,13,100	23
2008-09	87	17	104	72,45,650	1,75,66,620	1,03,20,970	53
2009-10	4480	2911	7391	-44,03,22,611	84,80,46,573	1,28,83,69,184	912
2010-11	6162	3883	10045	30,68,94,521	1,40,41,96,702	1,09,73,02,181	924
2011-12	11937	4251	16188	-20,79,48,754	3,69,89,48,455	3,90,68,97,209	1,008
2012-13	12565	7377	19942	-3,15,74,77,845	2,42,29,51,975	5,58,04,29,820	1,082
2013-14	16873	7857	24730	1,12,98,041	3,02,03,09,589	3,03,16,07,630	1,153
2014-15	8302	11099	19401	-1,69,36,27,768	3,63,89,82,122	5,33,26,09,890	1,171
Total	60433	37417	97850	-	15,06,33,87,401	20,26,49,49,984	6,326

Note: Financial year wise open market insider transactions made by the insiders and disclosed to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992. There are 49 open market transactions from 23 companies in the initial year, i.e., April 2007 to March 2008 to a high of 24,730 open market transactions from 1,153 companies during April 2013 to March 2014.

Table 4.2: Number of Companies with insider transactions and percentage of trade from April 2007 to March 2015

Percentage of Trade	Number of Companies							
	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
0%	4	6	85	116	132	123	79	83
5%	18	46	730	704	741	795	837	891
10%	0	1	62	67	90	103	149	121
20%	0	0	22	23	30	37	61	51
30%	1	0	8	2	11	11	16	15
40%	0	0	2	5	2	7	6	5
50%	0	0	1	2	1	0	1	3
60%	0	0	0	1	0	5	1	0
70%	0	0	0	0	0	0	0	0
80%	0	0	2	1	0	1	1	0
90%	0	0	0	1	1	0	0	0
100%	0	0	0	0	0	0	0	1
Total	23	53	912	922	1008	1082	1151	1170

Note: Number of Companies with insider transactions and percentage of the trade from April 2007 to March 2015, which are disclosed to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992.

Table 4.3: Number of Companies with portfolio characteristics of insider transactions from April 2007 to March 2015

Portfolio	Characteristic		2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
	BUY	SELL								
1	0 BUY	0 SELL	0	0	11	8	18	18	22	28
2	0 BUY	1 SELL	6	10	186	173	147	190	196	250
3	0 BUY	2 SELL	1	0	56	48	30	53	51	104
4	0 BUY	3 SELL	0	0	21	16	16	26	28	57
5	0 BUY	4 SELL	0	0	12	10	9	21	20	43
6	1 BUY	0 SELL	6	31	286	319	325	337	313	304
7	2 BUY	0 SELL	4	3	113	119	171	135	184	116
8	3 BUY	0 SELL	1	3	66	51	93	96	95	66
9	4 BUY	0 SELL	0	0	26	32	63	79	94	30
10	BUY	SELL	5	6	135	148	136	127	150	173
Total			23	53	912	924	1008	1082	1153	1171

Note: Portfolio wise and financial year wise classification of companies with insider transactions in ten portfolios, which were constructed based on the type of trade; which were made during April 2007 to March 2015 as per the disclosures made to the BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992.

Table 4.4: Category wise net insider transactions from April 2007 to March 2015

Category	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
NO BUY & SELL	0	0	11	8	18	18	22	28
SELL ONLY	7	10	275	247	202	290	295	454
BUY ONLY	11	37	491	521	652	647	686	516
BUY & SELL	5	6	135	148	136	127	150	173
TOTAL	23	53	912	924	1008	1082	1153	1171

Note: Category wise and financial year wise classification of companies with insider transactions; which were made during April 2007 to March 2015 as per the disclosures made to the BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992.

Table 4.5: Abnormal returns for insiders for ten portfolios from April 2007 to March 2014

Abnormal Return	2007	2008	2009	2010	2011	2012	2013	2014	Total Abnormal Return	Average Abnormal Return
0 BUY 0 SELL	0	0	4.06	-0.69	-5.62	-1.24	-1.32	3.23	-1.58	-0.197
0 BUY 1 SELL	-2.07	-1.14	-20	-11.94	-34.73	-13.54	14.13	22.17	-47.12	-5.890
0 BUY 2 SELL	-0.44	0	-22.5	9.51	-9.52	-4.13	-0.27	2.44	-24.91	-3.113
0 BUY 3 SELL	0	0	4.73	-3.54	-3.66	-9.92	-0.14	-4.84	-17.37	-2.171
0 BUY 4 SELL	0	0	2.87	0.1	-1.59	-4.7	-10.1	4.5	-8.92	-1.115
1 BUY 0 SELL	0.73	-9.59	37.58	32.2	-70.11	-32.07	44.15	58.53	61.42	7.677
2 BUY 0 SELL	0.18	-0.88	46.35	2.25	-42.98	-3.53	15.98	20.81	38.18	4.772
3 BUY 0 SELL	-0.34	-0.48	30.48	4.67	-24.04	-8.35	5.42	15.5	22.86	2.857
4 BUY 0 SELL	0	0	18.27	-1.89	-6.23	-0.33	12.71	5.01	27.54	3.442
BUY & SALE	-1.66	-0.67	-31.51	2.35	20	-18.69	1.5	24.17	-4.51	-0.563

Note: Abnormal returns of insider trades for each portfolio separately for each year from April 2007 to March 2014

Table 4.6: Regression results of insiders for ten portfolios from April 2007 to March 2015

Abnormal Return	Intercept	SMB	HML	WML	INDEX	Adj R Square
0 BUY 0 SELL	-0.003 (-1.296)	0.478 (9.153)	-0.284 (-0.538)	0.444 (4.948)	0.962 (5.310)	0.93
0 BUY 1 SELL	-0.004 (-2.208)	0.859 (7.280)	-0.437 (-4.058)	0.241 (20.625)	1.233 (3.736)	0.91
0 BUY 2 SELL	-0.007 (-2.033)	0.592 (9.515)	-0.441 (-4.383)	0.622 (11.388)	1.320 (27.731)	0.97
0 BUY 3 SELL	-0.004 (-1.047)	0.406 (3.406)	0.201 (2.861)	0.880 (10.972)	1.112 (7.811)	0.89
0 BUY 4 SELL	-0.001 (-1.888)	0.544 (6.398)	0.108 (2.002)	0.854 (7.456)	1.278 (5.235)	0.94
1 BUY 0 SELL	0.031 (2.087)	0.182 (2.430)	-0.897 (-3.087)	0.746 (7.900)	1.047 (3.509)	0.88
2 BUY 0 SELL	0.006 (2.445)	0.383 (8.366)	-0.939 (-5.133)	0.341 (5.584)	1.096 (8.426)	0.93
3 BUY 0 SELL	0.001 (1.130)	0.786 (7.306)	-0.139 (-1.220)	0.332 (7.035)	1.075 (5.226)	0.87
4 BUY 0 SELL	0.009 (1.624)	0.404 (3.112)	-0.779 (-1.469)	0.331 (6.674)	1.156 (2.367)	0.95
BUY & SALE	-0.010 (-0.699)	0.603 (2.404)	-0.990 (-3.141)	0.974 (8.535)	0.979 (3.228)	0.96

Note: Table 4.6 shows the coefficient estimates and t-stat in parenthesis for the 10 regressions estimated for the portfolios based on trade. The overall firm-years from April 2007 to March 2015 on a daily basis with 1976 observations.

The ten portfolios were used as dependent variables constructed based on the type of insiders transaction. Open market insider transactions from April 2007 to March 2015 are considered as shown in the Tables 4.6. The disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992 is the source of data. The data contain scrip code, scrip name, name of the

acquirer/seller, date of the transaction, buy/sell, mode of buy/sell, the quantity of shares transacted, the percentage of shares transacted, the holding after the transaction, percentage holding after transaction, regulation and reported to exchange date. End of the financial year data on the Market Capitalisation (MC) and Book Value (BV) per share of all listed companies in BSE is collected from the CMIE Prowess database for the study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded from that particular year. The returns are pooled over all the years as per the constructed portfolio characteristics and used as a dependent variable to estimate the regression. Returns were calculated by subtracting the daily interest rates of central and state government dated securities in India from the abnormal returns.

SMB, HML, WML factors are constructed through the Fama and French model on a daily basis. Whereas, Index is constructed based on all the listed companies of BSE by using the company's market capitalization and return on a daily basis (companies with the missing fields on Book value and market capitalization are excluded from the construction of Index).

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t$$

Table 4.7: Regression results of insider's buy and sell transactions across the portfolios from April 2007 to March 2015

Portfolio	Insider- Buy Only Group						Insider- Sell Only Group					
	Intercept	SMB	HML	WML	INDEX	Adj R Square	Intercept	SMB	HML	WML	INDEX	Adj R Square
Small	0.003 (1.41)	0.006 (0.34)	0.077 (3.35)	-0.052 (-2.42)	0.980 (4.88)	0.89	-0.002 (-1.87)	0.052 (5.22)	0.012 (0.87)	-0.009 (-0.71)	0.986 (3.67)	0.90
Medium	0.001 (2.06)	-0.249 (-3.01)	-0.081 (-3.02)	0.087 (3.51)	0.972 (3.63)	0.93	0.001 (1.09)	-0.075 (-8.90)	0.078 (6.61)	-0.026 (-2.40)	0.992 (4.65)	0.92
Big	0.004 (3.41)	-0.253 (-7.56)	-0.105 (-6.78)	-0.026 (-1.82)	0.992 (3.42)	0.96	-0.002 (-3.77)	-0.125 (-6.30)	-0.041 (-3.88)	-0.031 (-3.14)	0.997 (4.59)	0.95
Low BE/ME	0.003 (1.89)	-0.166 (-9.73)	-0.104 (-4.83)	0.007 (0.32)	0.982 (4.06)	0.91	-0.002 (-2.84)	-0.079 (-7.82)	0.001 (0.08)	-0.091 (-6.9)	0.994 (3.36)	0.92
Medium BE/ME	-0.001 (-1.11)	-0.161 (-9.61)	-0.101 (-5.21)	-0.017 (-0.93)	0.979 (3.38)	0.92	-0.003 (-1.41)	-0.074 (-8.35)	0.045 (3.60)	0.056 (4.85)	0.990 (4.42)	0.93
High BE/ME	0.002 (3.62)	-0.169 (-9.44)	0.096 (4.28)	0.019 (0.90)	0.983 (3.29)	0.95	0.002 (1.18)	0.005 (0.64)	0.003 (0.25)	-0.032 (-3.30)	0.991 (3.44)	0.96
Low Momentum	0.004 (2.04)	-0.153 (-9.51)	-0.062 (-2.77)	-0.111 (-5.32)	0.979 (3.323)	0.88	-0.003 (-2.03)	-0.072 (-8.96)	0.031 (2.77)	-0.138 (-9.25)	0.994 (3.70)	0.91
Medium Momentum	0.002 (3.19)	-0.191 (-9.13)	0.028 (1.48)	-0.123 (-6.99)	0.985 (4.434)	0.93	0.003 (0.22)	-0.047 (-5.35)	0.008 (0.65)	0.047 (4.16)	0.989 (5.55)	0.92
High Momentum	-0.002 (1.14)	-0.152 (-9.11)	-0.075 (-3.55)	0.243 (9.39)	0.980 (4.30)	0.95	-0.001 (-2.62)	-0.029 (-3.95)	0.009 (0.91)	0.024 (2.50)	0.992 (4.95)	0.96

Note: Table 4.7 shows the coefficient estimates and t-stat in parenthesis for the 18 regressions estimated for insider-buy and insider-sale groups overall firm-years from April 2007 to March 2015.

The nine portfolios were used as dependent variables constructed based on the SMB, HML and WML factors.. The disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992 is the source of data. The data contain scrip code, scrip name, name of the acquirer/seller, date of the transaction, buy/sell, mode of buy/sell, the quantity of shares transacted, the

percentage of shares transacted, the holding after the transaction, percentage holding after transaction, regulation and reported to exchange date. End of the financial year data on the Market Capitalisation (MC) and Book Value (BV) per share of all listed companies in BSE is collected from the CMIE Prowess database for the study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded from that particular year. The returns are pooled over all the years as per the constructed portfolio characteristics and used as dependent variable to estimate the regression. Returns were calculated by subtracting the daily interest rates of central and state government dated securities in India from the abnormal returns.

SMB, HML, WML factors are constructed through the Fama and French model on a daily basis. Whereas, Index is constructed based on all the listed companies of BSE by using the company's market capitalization and return on a daily basis (companies with the missing fields on Book value and market capitalization are excluded from the construction of Index).

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t$$

Table 4.8: Regression results of Outsider-Group across the portfolios from April 2007 to March 2015.

Outsider-Group						
Portfolio	Intercept	SMB	HML	WML	INDEX	Adj R Square
Small	0.000 (1.63)	0.364 (4.37)	-0.037 (-2.95)	0.012 (1.04)	0.98 (3.62)	0.92
Medium	0.000 (1.35)	0.342 (9.95)	0.000 (-0.02)	0.013 (0.90)	0.96 (5.13)	0.92
Big	0.000 (0.80)	-0.449 (-8.69)	0.097 (10.61)	0.005 (0.56)	0.98 (4.58)	0.95
Low BE/ME	0.000 (1.17)	0.057 (7.24)	-0.409 (-7.68)	0.005 (0.51)	0.98 (6.51)	0.87
Medium BE/ME	0.000 (1.84)	0.181 (8.482)	-0.012 (-1.08)	0.035 (3.39)	0.97 (8.15)	0.91
High BE/ME	0.000 (1.44)	0.019 (2.643)	0.481 (7.94)	-0.010 (-1.08)	0.98 (7.31)	0.94
Low Momentum	0.000 (0.96)	0.082 (9.37)	0.035 (3.19)	-0.398 (-8.96)	0.97 (8.78)	0.88
Medium Momentum	0.000 (0.50)	0.125 (11.83)	-0.020 (-1.35)	0.009 (0.67)	0.98 (4.34)	0.90
High Momentum	0.000 (1.80)	0.050 (7.62)	0.045 (4.93)	0.420 (9.67)	0.97 (4.25)	0.93

Note: Table 4.8 shows the coefficient estimates and returns for the 9 regressions estimated for outsider-group; overall firm-years from April 2007 to March 2015 on a daily basis.

The nine portfolios were used as dependent variables constructed based on the SMB, HML and WML portfolios. The disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992 is the source of data. The data contain scrip code, scrip name, the name of the acquirer/seller, date of the transaction, buy/sell, mode of buy/sell, the quantity of shares transacted, the percentage of shares transacted, the holding after the transaction, percentage holding after transaction, regulation and reported

to exchange date. End of the financial year data on the Market Capitalisation (MC) and Book Value (BV) per share of all listed companies in BSE is collected from the CMIE Prowess database for the study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded from that particular year. The returns are pooled over all the years as per the constructed portfolio characteristics and used as dependent variable to estimate the regression. Returns were calculated by subtracting the daily interest rates of central and state government dated securities in India from the abnormal returns.

SMB, HML, WML factors are constructed through the Fama and French model on a daily basis. Whereas, Index is constructed based on all the listed companies of BSE by using the company's market capitalization and return on a daily basis (companies with the missing fields on Book value and market capitalization are excluded from the construction of Index).

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t$$

Table 4.9: Regression results of insider's buy transactions during the phase-I and phase-II period from April 2007 to March 2015- Insider- Buy Only

Portfolio	Phase-I period						Phase-II period					
	Intercept	SMB	HML	WML	Index	Adj R Square	Intercept	SMB	HML	WML	Index	Adj R Square
Small	0.005 (1.65)	0.014 (0.58)	0.057 (1.73)	-0.053 (-1.80)	0.98 (5.26)	0.94	-0.003 (-0.66)	0.089 (4.04)	0.092 (3.24)	-0.013 (-0.37)	0.97 (8.88)	0.92
Medium	0.003 (2.07)	-0.271 (-9.25)	-0.084 (-2.05)	0.117 (3.23)	0.97 (6.34)	0.94	0.003 (1.89)	-0.175 (-9.95)	-0.031 (-1.38)	-0.181 (-6.37)	0.97 (5.14)	0.93
Big	0.003 (2.19)	-0.272 (-16.89)	-0.089 (-3.92)	-0.031 (-1.55)	0.99 (5.04)	0.95	0.001 (3.68)	-0.187 (-8.92)	-0.160 (-7.95)	-0.008 (-0.33)	0.99 (8.85)	0.95
Low BE/ME	-0.006 (-0.20)	-0.202 (-8.94)	-0.073 (-2.31)	0.019 (0.66)	0.98 (9.07)	0.87	-0.004 (-1.79)	-0.078 (-3.89)	-0.175 (-6.81)	-0.121 (-3.73)	0.98 (4.31)	0.9
Medium BE/ME	0.002 (2.38)	-0.157 (-7.74)	-0.100 (-3.53)	0.008 (0.31)	0.98 (7.96)	0.92	-0.002 (-0.08)	-0.121 (-6.93)	-0.105 (-4.68)	-0.173 (-6.10)	0.98 (8.55)	0.92
High BE/ME	0.001 (2.08)	-0.170 (-7.11)	0.057 (1.70)	0.007 (0.22)	0.98 (6.38)	0.96	0.002 (4.17)	-0.073 (-3.99)	0.180 (7.73)	0.091 (3.08)	0.97 (5.91)	0.95
Low Momentum	0.005 (2.49)	-0.155 (-6.56)	-0.052 (-1.58)	-0.082 (-2.83)	0.98 (7.06)	0.89	-0.007 (-0.32)	-0.080 (-4.09)	-0.099 (-3.87)	-0.290 (-8.97)	0.97 (6.64)	0.86
Medium Momentum	0.004 (1.97)	-0.199 (-8.05)	0.019 (0.68)	-0.140 (-5.74)	0.99 (5.45)	0.93	0.004 (3.14)	-0.112 (-6.54)	0.022 (0.99)	0.000 (0.08)	0.98 (5.21)	0.91
High Momentum	0.002 (1.10)	-0.176 (-7.84)	-0.082 (-2.62)	0.256 (9.24)	0.98 (7.77)	0.94	0.003 (2.65)	-0.080 (-4.59)	-0.022 (-0.98)	0.087 (3.05)	0.98 (7.87)	0.95

Note: Table 4.9 shows the coefficient estimates and returns for the 18 regressions estimated for insider-buy transactions during the phase-I and phase-II period; overall firm-years from April 2007 to March 2015 on a daily basis.

The nine portfolios were used as dependent variables constructed based on the SMB, HML and WML portfolios. Open market insider transactions from April 2007 to March 2015 are considered as shown in the Tables 4.9. The disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992 is the source of data. The data contain scrip code, scrip name, the name of the acquirer/seller, date of the transaction, buy/sell, mode of buy/sell, the quantity of shares transacted, the percentage of shares transacted, the holding after the transaction, percentage holding after transaction, regulation and reported to exchange date. End of the financial year data on the Market Capitalisation (MC) and Book Value (BV) per share of all listed companies in BSE is collected from the CMIE Prowess database for the study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded from that particular year. The returns are pooled over all the years as per the constructed portfolio characteristics and used as dependent variable to estimate the regression. Returns were calculated by subtracting the daily interest rates of central and state government dated securities in India from the abnormal returns.

SMB, HML, WML factors are constructed through the Fama and French model on a daily basis. Whereas, Index is constructed based on all the listed companies of BSE by using the company's market capitalization and return on a daily basis (companies with the missing fields on Book value and market capitalization are excluded from the construction of Index).

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t$$

Table 4.10: Regression results of insider's sell transactions during the phase-I and phase-II period from April 2007 to March 2015- Insider- Sell Only

Portfolio	Phase-I period						Phase-II period					
	Intercept	SMB	HML	WML	Index	Adj R Square	Intercept	SMB	HML	WML	Index	Adj R Square
Small	-0.003 (-1.31)	0.044 (3.26)	-0.010 (-0.50)	-0.018 (-1.06)	0.99 (8.84)	0.86	0.002 (1.12)	0.125 (7.46)	0.064 (2.97)	0.016 (0.59)	0.98 (6.72)	0.9
Medium	-0.001 (-2.65)	-0.050 (-5.02)	0.028 (1.98)	-0.043 (-3.49)	0.99 (7.73)	0.92	-0.003 (-2.22)	-0.064 (-4.28)	0.181 (9.54)	0.123 (5.12)	0.98 (9.56)	0.91
Big	-0.001 (-1.30)	-0.094 (-9.20)	-0.020 (-1.41)	-0.038 (-3.05)	1.00 (6.64)	0.94	-0.001 (-5.61)	-0.173 (-15.89)	-0.158 (-9.41)	0.120 (6.83)	0.99 (9.04)	0.95
Low BE/ME	-0.005 (-2.87)	-0.050 (-4.46)	-0.005 (-0.34)	-0.108 (-7.82)	1.00 (8.12)	0.9	-0.003 (-0.35)	-0.026 (-1.48)	-0.071 (-3.17)	0.135 (4.73)	0.97 (5.94)	0.89
Medium BE/ME	-0.004 (-1.04)	-0.054 (-4.31)	0.019 (1.10)	0.053 (3.46)	0.99 (8.65)	0.93	0.002 (1.22)	-0.071 (-5.79)	0.091 (5.84)	0.099 (4.98)	0.98 (8.74)	0.92
High BE/ME	0.002 (0.46)	0.003 (0.30)	-0.016 (-0.97)	-0.044 (-3.12)	0.99 (4.58)	0.94	-0.002 (-1.47)	-0.014 (-2.30)	0.067 (8.50)	0.026 (2.64)	0.99 (9.94)	0.94
Low Momentum	-0.004 (-2.81)	-0.056 (-5.37)	0.021 (1.43)	-0.144 (-9.12)	1.00 (5.35)	0.88	-0.006 (-2.04)	-0.044 (-3.50)	0.017 (1.05)	-0.046 (-2.23)	0.98 (4.86)	0.9
Medium Momentum	-0.004 (-1.19)	-0.032 (-2.79)	-0.018 (-1.13)	0.034 (2.38)	0.99 (5.40)	0.92	0.004 (1.37)	-0.038 (-2.57)	0.058 (3.04)	0.150 (6.19)	0.98 (9.43)	0.92
High Momentum	0.001 (0.75)	-0.011 (-1.13)	-0.005 (-0.32)	0.011 (0.88)	0.99 (7.56)	0.94	-0.003 (-3.10)	-0.028 (-2.50)	0.012 (0.79)	0.155 (8.44)	0.98 (7.53)	0.93

Note: Table 4.10 shows the coefficient estimates and returns for the 18 regressions estimated for insider-sale transactions during the phase-I and phase-II period; overall firm-years from April 2007 to March 2015 on a daily basis.

The nine portfolios were used as dependent variables constructed based on the SMB, HML and WML portfolios. Open market insider transactions from April 2007 to March 2015 are considered as shown in the Tables 4.10. The disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992 is the source of data. The data contain scrip code, scrip name, the name of the acquirer/seller, date of the transaction, buy/sell, mode of buy/sell, the quantity of shares transacted, the percentage of shares transacted, the holding after the transaction, percentage holding after transaction, regulation and reported to exchange date. End of the financial year data on the Market Capitalisation (MC) and Book Value (BV) per share of all listed companies in BSE is collected from the CMIE Prowess database for the study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded from that particular year. The returns are pooled over all the years as per the constructed portfolio characteristics and used as dependent variable to estimate the regression. Returns were calculated by subtracting the daily interest rates of central and state government dated securities in India from the abnormal returns.

SMB, HML, WML factors are constructed through the Fama and French model on a daily basis. Whereas, Index is constructed based on all the listed companies of BSE by using the company's market capitalization and return on a daily basis (companies with the missing fields on Book value and market capitalization are excluded from the construction of Index).

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t$$

Table 4.11: Regression results of Outsider-Group during the phase-I and phase-II period from April 2007 to March 2015- Outsider Group

Portfolio	Phase-I period						Phase-II period					
	Intercept	SMB	HML	WML	Index	Adj R Square	Intercept	SMB	HML	WML	Index	Adj R Square
Small	0.001 (1.23)	0.360 (8.94)	0.001 (0.06)	0.019 (1.25)	0.98 (5.62)	0.92	0.001 (1.27)	0.323 (3.40)	-0.139 (-7.8)	-0.010 (-0.44)	0.99 (4.86)	0.89
Medium	0.000 (0.48)	0.343 (9.98)	-0.016 (-0.65)	0.008 (0.38)	0.96 (4.56)	0.92	0.001 (0.82)	0.284 (4.08)	0.077 (5.12)	0.001 (0.05)	0.97 (6.47)	0.91
Big	0.000 (0.53)	-0.458 (-7.68)	0.103 (7.63)	0.012 (1.04)	0.98 (8.62)	0.95	0.000 (0.51)	-0.426 (-5.34)	0.086 (7.98)	-0.054 (-3.94)	0.98 (6.70)	0.94
Low BE/ME	0.000 (0.82)	0.055 (4.86)	-0.415 (-6.07)	0.004 (0.30)	0.98 (5.48)	0.87	0.000 (0.920)	0.023 (2.21)	-0.374 (-8.76)	-0.007 (-0.43)	0.98 (5.12)	0.89
Medium BE/ME	0.001 (2.52)	0.182 (4.98)	-0.004 (-0.24)	0.041 (2.77)	0.97 (4.85)	0.9	0.000 (0.95)	0.150 (8.260)	-0.021 (-2.02)	-0.016 (-1.22)	0.97 (7.76)	0.92
High BE/ME	0.000 (0.52)	0.008 (0.75)	0.507 (4.89)	-0.006 (-0.47)	0.98 (8.82)	0.93	0.000 (0.01)	0.008 (0.891)	0.420 (6.08)	-0.040 (-2.67)	0.98 (5.48)	0.93
Low Momentum	-0.001 (-0.88)	0.064 (5.35)	0.040 (2.38)	-0.401 (-7.35)	0.97 (7.93)	0.9	0.000 (0.09)	0.123 (5.55)	0.032 (3.14)	-0.417 (-3.41)	0.97 (5.94)	0.88
Medium Momentum	0.000 (0.44)	0.148 (9.90)	-0.010 (-0.45)	0.012 (0.66)	0.97 (5.36)	0.91	-0.001 (-0.52)	-0.065 (-5.08)	-0.011 (-0.67)	0.007 (0.32)	0.99 (6.77)	0.92
High Momentum	-0.001 (-1.02)	0.034 (3.55)	0.058 (4.34)	0.429 (6.59)	0.97 (9.03)	0.95	-0.001 (-1.58)	0.122 (5.10)	0.004 (0.40)	0.347 (6.39)	0.97 (6.99)	0.95

Note: Table 4.11 shows the coefficient estimates and returns for the 18 regressions estimated for outsider-transactions during the phase-I and phase-II period; over all firm years from April 2007 to March 2015 on a daily basis.

The nine portfolios were used as dependent variables constructed based on the SML, HML and WML categories. Open market insider transactions from April 2007 to March 2015 are considered as shown in the Table 4.11. The disclosures made to BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992 is the source of data. The data contain scrip code, scrip name, the name of the acquirer/seller, date of the transaction, buy/sell, mode of buy/sell, the quantity of shares transacted, the percentage of shares transacted, the holding after the transaction, percentage holding after transaction, regulation and reported to exchange date. End of the financial year data on the Market Capitalisation (MC) and Book Value (BV) per share of all listed companies in BSE is collected from the CMIE Prowess database for the study period. If the market capitalization or book value per share is unavailable for a company for a particular year, then that company is excluded from that particular year. The returns are pooled over all the years as per the constructed portfolio characteristics and used as a dependent variable to estimate the regression. Returns were calculated by subtracting the daily interest rates of central and state government dated securities in India from the abnormal returns.

SMB, HML, WML factors are constructed through the Fama and French model on a daily basis. Whereas, Index is constructed based on all the listed companies of BSE by using the company's market capitalization and return on a daily basis (companies with the missing fields on Book value and market capitalization are excluded from the construction of Index).

The regressions are estimated by using the following equation.

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t$$

Table 4.12: Correlation between net buy

	<i>Net Buy</i>	<i>1 Quarter Returns</i>	<i>2 Quarter Returns</i>	<i>3 Quarter Returns</i>	<i>4 Quarter Returns</i>
Net Buy	1				
1 Quarter Returns	0.000314237	1			
2 Quarter Returns	0.000213976	-0.005244816	1		
3 Quarter Returns	0.000443486	-0.01930253	0.003548923	1	
4 Quarter Returns	0.000238737	0.015690051	-0.01311386	-0.014349467	1

Correlation between net sales

	<i>Net Sale</i>	<i>1 Quarter Returns</i>	<i>2 Quarter Returns</i>	<i>3 Quarter Returns</i>	<i>4 Quarter Returns</i>
Net Sales	1				
1 Quarter Returns	0.000258802	1			
2 Quarter Returns	-0.000459496	-0.004579082	1		
3 Quarter Returns	-0.000928295	0.03633032	0.009349322	1	
4 Quarter Returns	-0.001773766	-0.000104051	0.022926805	0.059555705	1

Note: The correlation coefficients are calculated based on daily returns for each of the subsequent four quarters. Quarterly returns which are sorted as net insiders buy and net insiders sale. There are 6,258 net buy and 2,921 net sale insider transactions from April 2007 to June 2014. If the insider has bought and sold the shares in that particular quarter and he is not having any holdings for that quarter, such transactions are excluded from the study.

CHAPTER 5

INFORMATION CONTENT OF INSIDER TRADING

5.1 INTRODUCTION

The primary motive of imposing insider trading regulations is to create a level playing field in the securities market and to instill the investor confidence. Insiders such as a key managerial person, director/promoter of a publicly listed company have an advantage of information over outsiders as they possess valuable information about firm's earnings (Seyhun 1986; Jagolinzer et al. 2011). Corporate insiders are thought to have private information not available to others which provide them an advantage in investment activities. The media disseminate such information as news. News plays a significant role in framing trade and price patterns in stock markets (Foucault et.al. 2016). It has attracted the interest of the regulatory bodies and academicians to identify the unique information insiders possess, as well as the profits they earn (Jaffe 1974).

The transaction made by the insiders of a listed company has to be reported to the respective stock exchange. Such information is helpful to assess the abnormal returns that arise before or after the transaction day. The study augments the inquiry by highlighting the information asymmetry of insider trades. This research aims to investigate whether insiders earn abnormal returns on their trades and to document any difference between abnormal return between the purchase and sale transactions. With this analysis and findings, the study can conclude whether the market is information efficient or not. Several studies which are centered on the US stock markets consistently confirm that insiders are certainly well informed and they do earn abnormal profits. Jaffe (1974) with insider purchase and sale transactions together, and Finnerty (1976) study with insider purchase or sale portfolios separately found that insiders can outperform the market. When compared to the emerging markets like India, developed markets are more efficient in dealing with the insider trading charges and prosecution of insiders (Misra 2011). Does insider trading signal

any positive/negative information to the market and do they earn an abnormal return from their purchase/sale activity is the central point of this study.

Rozeff and Zaman (1988) used the market model to find the abnormal returns by using US data and found that outsiders can profit from the publicly available insider trading data. On the other hand, Lin and Howe (1990) study from NASDAQ found that outsiders cannot earn abnormal returns by mimicking the insider trades. It has to be empirically tested to know the information content of insiders' trade and the profitability for outsiders if they follow and mimic insider trades.

Many papers have investigated insider trading in US and European markets. The present research proposes to focus on the Indian stock market. The motivation of using Indian insider trading data is as noted by Bushman et al. (2005) that the analysts concentrate more in emerging markets after the enforcement of insider trading laws than in developed markets. It may be because of the existence of insider trading laws only in books but not in the prosecution of insiders in these markets (Bhattacharya and Daouk 2002; Manchikatla and Acharya 2017).

In India, insider trading is regulated by Securities Exchange Board of India (SEBI) under SEBI (Prohibition of Insider Trading) Regulations, 2015⁶. It prohibits the insiders from trading in securities while in possession of UPSI. As per the regulations, insiders are compelled to disclose the details of their trade to the specific stock exchange where the company is listed. Also, these disclosures of insider trading activities are publicly available. There is an intuition in the market that insiders possess valuable information of their company and they trade on private information. Lakonishok and Lee (2001) found that market initially ignores valuable information when it is reported. Media plays a significant role in the dissemination of news (Rogers et al. 2016) which reduces the future trading profits of insiders by publicizing regulatory disclosures (Dai et al. 2015).

⁶ It is the new regulation of SEBI, earlier it was; SEBI (Prohibition of Insider Trading) Regulations, 1992.

The study examines insider transactions by classifying the companies based on three factors viz. Market Capitalization (Size), Book-to-market equity ratio (BE/ME), and momentum. It considers all the listed companies of BSE during April 2007 to March 2015 period. Insiders' purchase and sale transactions are analyzed separately to identify the pattern of abnormal return with 4-factor asset pricing model that adjusts for size, book to market equity and momentum factors along with the broad-based market index (Fama et al. 1969; Fama and French 1993; MacKinlay 1997; Carhart 1997). The present study uses event study methodology to assess the abnormal return pattern in insider purchase and sale transactions. Nine portfolios are created with equal-weighted index and value-weighted index (Loughran and Ritter 2000; Jeng et al. 2003; Bartholdy and Peare 2005) based on the 4-factor Carhart (1997) model to determine the abnormal returns to insiders. The results of the research confirm that the securities that insiders purchase and the securities they sell convey distinct information to the market. Insider purchases appear to carry positive information than insider sales. The trading period abnormal returns are quite larger in magnitude, especially for insider purchases to that of insider sales. Whereas, outsider group do not earn significant abnormal return in the event window. This study inspects the essence of the information that is signaled by insider purchase/sale transactions. The key contribution is to document whether insiders purchase (sale) signs favorable (unfavorable) information to the market.

5.2 DATA AND METHODOLOGY

The financial year-wise data about the listed companies of BSE is obtained from CMIE Prowess database. Market Capitalization (MC), Book Value (BV) per share were downloaded from the Prowess database on the financial year basis. If the market capitalization or book value per share for a company is unavailable, then that company is excluded in that particular year.

The insider transactions are obtained from disclosures made to the BSE under SEBI (Prohibition of Insider Trading) Regulations, 1992. These disclosures contain the insider transactions of all the listed companies of BSE from 1st April 2007 to 31st March 2015. There is a total of 1,78,952 insider transactions which were made during

the study period, out of which 97,850 transactions are done through the open market by the insiders are considered. The transaction date in a range, missing fields of purchase/sale and transactions with missing transaction dates amounting to 11,377 transactions are eliminated in the data set because 30-days event window is created based on the transaction date (Kothari and Warner 1997; Lyon et al. 1999, Brav 2000; Dionysiou 2015). The daily data is used because it is reliable to evaluate firm performance over shorter time periods.

The 4-factor asset pricing model is used in the present study. The equation is specified as follows:

$$(R_{it} - R_{Ft}) = \alpha_i + \beta_1(R_{Mt} - R_{Ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t \quad (5.1)$$

Where R_{it} is the daily return on a stock i at time t , R_{Ft} is the daily interest rate of government dated securities at time t . R_{Mt} is the return of the constructed market index⁷ at time t . SMB_{mt} (Small Minus Big) is the return on a portfolio of small stocks minus the return on a portfolio of big stocks. HML_{mt} (High Minus Low) is the return on the portfolio of stocks with a high book to market value of equity minus the return on a portfolio of stocks with low book to market values. WML_{mt} (Winners Minus Losers) is the return on the portfolio of stocks with high momentum minus the return on a portfolio of stocks with low momentum. ε_t is the error term in the regression.

The Carhart (1997) model is found to be the most suitable performance yardstick for the Indian markets (Sehgal and Babbar 2017). The study of Sehgal and Jain (2015) based on the 493 firms listed on BSE investigated the role of macroeconomic variables about the momentum factor. They also found that momentum factor explains the abnormal returns better than CAPM and Fama and French (1993) three-factor models. However, a similar study by Dash and Mahakud (2015) by using Fama and French (1993) three-factor and Carhart (1997) four-factor model found that book to market equity ratio and momentum factors have a higher impact in explaining the

⁷Index has been constructed for 't' year by dividing the individual company market capitalization with the total market capitalization of 't' year. Value-weights are calculated by the (portfolio weight *log returns). Whereas, daily returns are calculated by Ln of daily closing market capitalization.

cross-section of returns than other factors. Considering the findings of extant studies in the Indian context, the present study uses four-factor model.

All the BSE listed companies are classified into three categories based on size, book-to-market, and momentum. Small minus Big (SMB) category is constituted based on the market capitalization where bottom 30% is categorized as Small (S), middle 40% as a Medium (M) and the top 30% as Big (B). Similarly, High minus Low (HML) category is formed based on the Book to Market Equity (BE/ME) ratio. The top 30% is categorized as High (H), middle 40% as a Medium (M) and the bottom 30% as Low (L). In the same manner, Winners minus Losers (WML) category is created based on the momentum, the bottom 30% is categorized as Low Momentum (LM), the middle 40% as Medium Momentum (MM) and the top 30% as High Momentum (HM).

Total 27 portfolios are constructed with nine portfolios in each category of SMB, HML, and WML i.e., nine portfolios in each of the three variables because there are three groups in each of the variables. For e.g. in size group, there are nine portfolios viz. S/L/LM, S/M/MM, S/H/HM, M/L/LM, M/M/MM, M/H/HM, B/L/LM, B/M/MM, B/H/HM. In the same way, BE/ME and momentum portfolios are constructed. SMB has emerged by taking a simple average difference between three small and big size portfolios, HML as the difference between three high and low BE/ME portfolios and WML as the difference between the three winning and losing portfolios. By taking a simple average difference between three small and three big stock portfolios SMB (Small minus Big) category has been formed. Similarly, by taking a simple average difference between three high BE/ME and three low BE/ME companies HML (High minus Low) category has been formed. Lastly, by taking a simple average difference between the three winners and the three losing companies based on momentum WML (Winners minus Losers) category has been formed.

In the present study, insider transaction date is considered as an event date. Based on the transaction date, the event window is generated for a 30-day window for pre-event and post-event. Abnormal returns (AR) are computed on a daily basis for the insider transactions and matched to the prior 30 days and post 30 days around the insider

transaction date. AR is calculated by subtracting the expected return from the actual return (Abnormal Return=actual return-expected return).

Nine portfolios were created i.e. small, medium, big, low b/m, medium b/m, high b/m, low momentum, medium momentum and high momentum (Table 5.1). The Cumulative Average Abnormal Return (CAAR) is arrived by taking the average daily abnormal return (AR) separately for the 30 days event window i.e. for both pre-event and post-event. Insider and outsider CAAR are aggregated for both purchase and sale separately (Figure 5.1) for the entire study period. Further, equal-weighted and value-weighted returns are calculated separately for the three categories to purchase and sale on a daily basis for a pre-event and post-event window of 30 days each.

5.3 EMPIRICAL RESULTS

Table 5.1 reports the insider purchase and sale transactions across size, BE/ME and momentum categories. There is concentration of both purchase and sale transactions in large size, followed by the medium and small size companies. This follows the general market trend, there is concentration of transactions in large size companies. Based on BE/ME ratio, insiders buy more in medium BE/ME, followed by low BE/ME and high BE/ME, whereas insider sales are concentrated in low BE/ME, followed by medium and high BE/ME ratio companies. Finally, momentum category presents a slightly different picture. Insider purchases are equally distributed across the three categories of momentum, namely low, medium and high momentum. In contrast, sale transactions are highly concentrated in the high momentum category and very less transactions are in the low and medium momentum category. Overall, there are more purchase transactions compared to sale transactions.

Table 5.2 reports the 30 day Cumulative Average Abnormal Return (CAAR) before and after the insider trading event for purchase and sale transactions. Further, the study compares the CAAR of insider transaction with the outsider group for the same period. Year wise 30 day CAAR for insider purchase and sale transaction shows that insiders earn positive CAAR in the pre-event window, purchase transactions earn slightly higher CAAR than sale transactions. In the post-event window, insider

purchase transactions still earn positive CAAR, but there is a substantial reduction compared to pre-event CAAR. In contrast, insider sale transactions earn a negative CAAR in the post-event window. The outsider group which is free from the influence of insider trading earns a very negligible CAAR during the same pre and post-event period.

To further decipher the pattern of CAAR around the insider trading event, both purchase and sale portfolios are constructed based on size, BE/ME ratio and momentum factors. Table 5.3 reports the equal weight CAAR for insider purchase and sale portfolios in the pre and post-event window. Insider purchase portfolios earn positive CAAR across all nine categories of portfolios in the pre and post-event period, albeit a marginal decline in the post-event period. Insider sale portfolios earn positive CAAR in the pre-event window and a negative CAAR in the post-event window. Across the same categories, the study calculates the value weight CAAR for the pre and post-event window, results are reported in the table 5.4. The findings of the equal weight portfolios are reflected in the value weight calculation as well. Further, the study calculates the equal weight CAAR for the outsider group across same portfolios and Table 5.5 reports the results. Outsider groups do not seem to earn abnormal returns as compared with insider portfolios.

To test the statistical significance of the CAAR results, the study calculates the t statistic for the daily CAAR for the insider purchase, sale portfolios and outsider group for the pre and post event window. Table 5.6 reports the day wise CAAR for insider purchase, sale and outsider group portfolios for the pre-event window and Table 5.7 for the post-event window. Insider purchase portfolio earns positive CAAR throughout the 30 days pre-event window and it is statistically significant for most of the period. However, the CAAR in the sale portfolio changes its sign from negative to positive and statistically significant for lesser number of days in comparison with the purchase portfolio. In contrast, outsider group do not report even a single statistically significant CAAR in the pre-event window. In the post-event window, insider purchase portfolio continues to earn positive CAAR and results are statistically significant considering the t value. Insider sale portfolio earns negative CAAR and the

results are mostly significant. However, insider sale portfolio reports lesser number of days in which statistically significant CAAR is recorded in comparison with the purchase portfolio. Outsider group do not report statistically significant CAAR in the post-event as well.

CAAR of insider purchase, sale and outsider group portfolios in the pre-event and post-event window is shown in Figure 1. It clearly shows that purchase portfolio earns positive CAAR throughout pre and post-event window. In contrast, sale portfolio earns positive CAAR in the pre-event window for most days, whereas it earns negative CAAR in the post-event window. However, positive CAAR of sale portfolio in the pre-event window is less than that of purchase portfolio and in the post-event window, the absolute size of the CAAR of sale portfolio is less than the purchase portfolio. CAAR of the outsider group is very less compared with the purchase or sale portfolio in the pre or post-event window.

Overall, the results of the study confirm that the insiders earn abnormal return on their purchase transactions in pre as well as post-event window and negative abnormal returns on sale transactions in the post-event window. However, the absolute size of negative abnormal return is smaller than the positive abnormal return. Outsider group does not earn any abnormal return in either pre or post-event window. This confirms that insider transactions contain information which is not available in the market or it releases positive news to the market in purchase transactions and negative news in sale transactions. The prior literature as documented by Aboody and Lev (2000), Huddart and Ke (2007), Jagolinzer et al. (2011) has found that on an average, executives profit from purchases but not from sales. Findings of the present study is slightly different from the extant studies based on the fact that insider sale portfolio earns negative abnormal return. However, the smaller negative abnormal return confirms that purchase portfolio contains more information than the sale portfolio.

5.4 SUMMARY AND CONCLUSION

This study assesses the information content of insider trading by calculating cumulative abnormal returns of open-market insider transactions in BSE-listed firms

using event study methodology. The study examines the market reaction to the insider trades around 30 days of the trading day for purchase and sale transactions separately. The study classifies the insider purchase and sale portfolios based on standard investment strategies like size, BE/ME ratio and momentum. Further, the study compares the findings of the insider portfolio with rest of the market after neutralizing the impact of insider transactions. The result suggests that both purchases and sales are informative. However, purchase transactions cause a substantially higher impact on returns than the sales transactions. Further, comparison with the rest of the market shows that outsider group does not cause similar impact in the corresponding period.

The study concludes that insider transactions release information to the market. Specifically, purchase transactions lead to positive abnormal returns, whereas sale transactions lead to negative abnormal returns. This study supplements previous studies by investigating in emerging market; it presents findings that are distinct from those witnessed by developed markets. Future research can be carried out to find the optimal trading strategies by considering the difference between the insider transaction date and the reporting date to the stock exchange/regulatory body.

Table 5.1: Category wise summary of insider purchase and sale transactions from April 2007 to March 2015

Category	Sub-Category	purchase transactions	Total purchase transactions (A)	Sale transactions	Total sale transactions(B)	Total (C= A+B)
Size	Small	1588 (2%)	56180 (61%)	429 (1%)	35240 (39%)	91420 (100%)
	Medium	14793 (16%)		5024 (5%)		
	Big	39799 (44%)		29787 (33%)		
BE/ME Ratio	Low BE/ME	15335 (17%)	56180 (61%)	19639 (21%)	35240 (39%)	91420 (100%)
	Med BE/ME	33282 (36%)		14201 (16%)		
	High BE/ME	7563 (8%)		1400 (2%)		
Momentum	Low Momentum	18754 (21%)	56180 (61%)	5132 (6%)	35240 (39%)	91420 (100%)
	Med Momentum	15918 (17%)		5493 (6%)		
	High Momentum	21508 (24%)		24615 (27%)		

Note: Table 5.1: reports the category wise insider purchase and sale transactions in the nine sub-categories for the study period April 2007 to March 2015

Table 5.2: 30 Day Cumulative Average Abnormal Return (CAAR) for Insider and Outsider group on yearly basis

Year	Insider 30 Days CAAR				Outsider 30 Days CAAR	
	Pre-Event		Post-Event		Pre-Event	Post-Event
	Purchase	Sale	Purchase	Sale		
2007	0.0694	0.0286	0.0554	-0.0275	0.0023	0.0041
2008	0.0561	0.0156	0.0003	0.0056	-0.0019	-0.0017
2009	0.0346	0.0330	0.0420	0.0063	-0.0017	0.0043
2010	0.0006	0.0449	0.0123	0.0060	0.0017	-0.0034
2011	-0.0039	0.0084	0.0060	-0.0067	-0.0032	-0.0024
2012	-0.0035	-0.0094	-0.0013	-0.0106	0.0013	0.0013
2013	0.0173	0.0161	0.0087	-0.0014	0.0035	0.0028
2014	0.0162	0.0138	-0.0380	-0.0336	-0.0016	-0.0048
Average	0.0234	0.0189	0.0107	-0.0077	0.0001	0.0001
Total	0.1868	0.1510	0.0854	-0.0619	0.0004	0.0002

Note: The table 5.2: report the 30 Day Cumulative Average Abnormal Return (CAAR) for Insider and Outsider group on a yearly basis for insider purchase and sale transactions in the pre-event and post-event for the study period April 2007 to March 2015.

Table 5.3: 30 Day Insider Equal Weighted Cumulative Average Abnormal Return (CAAR)

Equal Weighted Returns					
Category	Sub-Category	Pre-Event		Post-Event	
		Purchase	Sale	Purchase	Sale
Size	Small	0.0200	0.0029	0.0100	-0.0330
	Medium	0.0140	0.0041	0.0110	-0.0010
	Big	0.0160	-0.0002	0.0030	-0.0011
BE/ME	Low BE/ME	0.0070	0.0013	0.0040	-0.0012
	Medium BE/ME	0.0220	0.0012	0.0010	-0.0007
	High BE/ME	0.0170	0.0051	0.0100	-0.0110
Momentum	Low Momentum	0.0870	0.0033	0.0180	-0.0070
	Medium Momentum	0.0090	0.0038	0.0030	-0.0023
	High Momentum	0.0040	-0.0002	0.0040	-0.0022
Average		0.0218	0.0024	0.0071	-0.0066
Total		0.1960	0.0213	0.0640	-0.0595

Note: Table 5.3: reports the 30 Days equal weighted Cumulative Average Abnormal Return (CAAR) in the pre-event and post-event for insiders in the nine sub-categories for the study period April 2007 to March 2015.

Table 5.4: 30 Day Insider Value Weighted Cumulative Average Abnormal Return (CAAR)

Value Weighted Returns					
Category	Sub-Category	Pre-Event		Post-Event	
		Purchase	Sale	Purchase	Sale
Size	Small	0.026	0.0032	0.0085	-0.028
	Medium	0.011	0.0035	0.0016	-0.002
	Big	0.019	-0.001	0.0025	-0.00163
BE/ME	Low b/m	0.0068	0.0015	0.0037	-0.0022
	Medium b/m	0.02	0.00088	0.0018	-0.00029
	High b/m	0.015	0.006	0.015	-0.0014
Momentum	Low Momentum	0.076	0.0048	0.02	-0.0068
	Medium Momentum	0.0009	0.004	0.004	-0.0089
	High Momentum	0.0021	-0.001	0.005	-0.00236
Average		0.0196	0.0024	0.0069	-0.0060
Total		0.1768	0.0219	0.0621	-0.0536

Note: The table 5.4: reports the 30 Days value weighted Cumulative Average Abnormal Return (CAAR) in the pre-event and post-event for insiders in the nine sub-categories for the study period April 2007 to March 2015.

Table 5.5: 30 Day Outsider Group Equal Weighted Cumulative Average Abnormal Return (CAAR)

Outsider Equal Weighted Returns			
Category	Sub-Category	Pre-Event	Post-Event
SMB	Small	0.0006	0.0002
	Medium	-0.0007	-0.0002
	Big	-0.0006	-0.0014
HML	Low b/m	0.0001	-0.001
	Medium b/m	-0.0002	-0.0002
	High b/m	0.001	0.0007
WML	Low Momentum	0.0005	0.0014
	Medium Momentum	0.0002	0.0055
	High Momentum	-0.0005	-0.0046
Average		0.0001	0.0001
Total		0.0004	0.0004

Note: Table 5.5: reports the 30 Days equal weighted Cumulative Average Abnormal Return (CAAR) in the pre-event and post-event for Outsider group in the nine sub-categories for the study period April 2007 to March 2015.

Table 5.6: Significance Tests for Cumulative Average Abnormal Return (CAAR) for pre-event window

Pre-event window	Insider Purchases		Insider Sale		Outsider Sample	
	CAAR	t-statistic	CAAR	t-statistic	CAAR	t-statistic
-1	0.2%	1.747	0.2%	1.877	0.03%	0.117
-2	0.2%	1.465	0.0%	0.271	0.04%	0.187
-3	0.2%	1.020	-0.1%	-0.562	0.02%	0.055
-4	0.2%	0.848	-0.1%	-0.461	0.04%	0.185
-5	0.4%	1.779	-0.4%	-1.831	0.08%	0.365
-6	0.4%	1.852	-0.7%	-3.102	0.06%	0.285
-7	0.4%	1.462	-0.7%	-2.742	0.06%	0.271
-8	0.2%	0.834	-0.5%	-1.997	0.06%	0.276
-9	0.4%	1.290	-0.4%	-1.394	0.06%	0.274
-10	0.6%	1.952	-0.4%	-1.255	0.06%	0.276
-11	0.6%	1.905	-0.1%	-0.427	0.05%	0.201
-12	0.6%	1.929	-0.2%	-0.602	0.05%	0.200
-13	1.0%	2.808	0.0%	-0.012	0.05%	0.203
-14	1.1%	2.989	-0.1%	-0.151	0.06%	0.275
-15	1.5%	3.988	0.1%	0.145	0.07%	0.311
-16	1.6%	4.214	-0.1%	-0.215	0.09%	0.467
-17	1.6%	4.117	-0.1%	-0.154	0.11%	0.641
-18	1.7%	4.136	0.0%	0.086	0.12%	0.694
-19	1.8%	4.343	0.0%	-0.107	0.11%	0.627
-20	2.0%	4.693	0.2%	0.562	0.09%	0.461
-21	2.1%	4.841	0.7%	1.640	0.08%	0.371
-22	2.2%	4.807	0.9%	2.063	0.08%	0.368
-23	2.4%	5.204	1.1%	2.343	0.08%	0.366
-24	2.6%	5.513	1.1%	2.263	0.10%	0.559
-25	2.6%	5.429	1.2%	2.557	0.11%	0.648
-26	2.7%	5.473	1.2%	2.510	0.10%	0.537
-27	2.7%	5.373	1.2%	2.402	0.12%	0.683
-28	3.0%	5.896	1.4%	2.799	0.14%	0.764
-29	3.3%	6.400	1.8%	3.488	0.15%	0.845
-30	3.7%	6.958	2.1%	4.032	0.15%	0.853

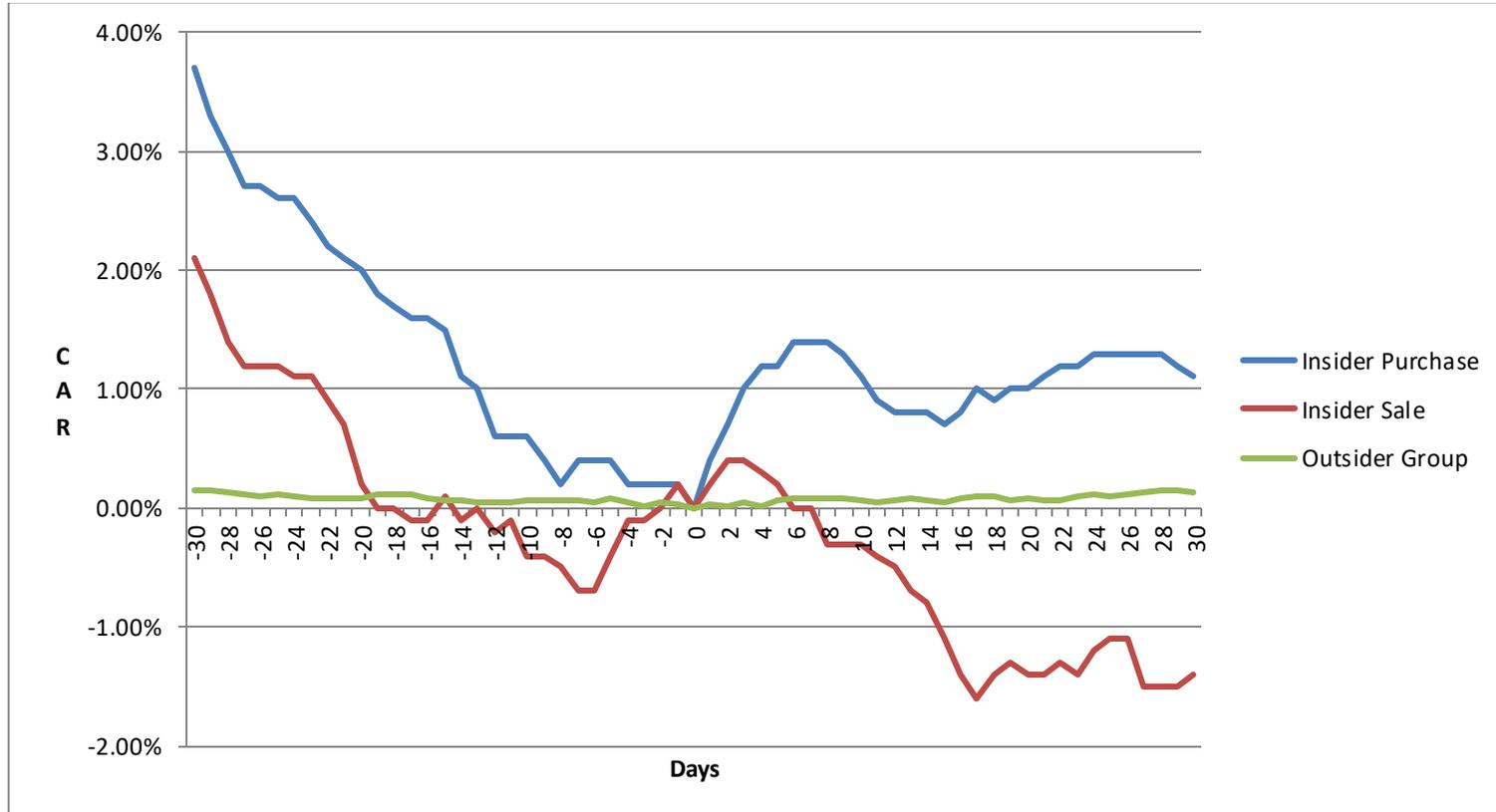
Note: Table 5.6: reports significance tests for Cumulative Average Abnormal Return (CAAR) for a pre-event window with t-statistics on abnormal returns. The results are statistically significant.

Table 5.7: Significance Tests for Cumulative Average Abnormal Return (CAAR) for post-event window

Post-event window	Insider Purchase		Insider Sale		Outsider Sample	
	CAAR	t-statistic	CAAR	t-statistic	CAAR	t-statistic
1	0.4%	0.730	0.2%	0.456	0.03%	0.127
2	0.7%	1.291	0.4%	0.785	0.02%	0.086
3	1.0%	1.747	0.4%	0.623	0.04%	0.195
4	1.2%	2.069	0.3%	0.592	0.02%	0.095
5	1.2%	2.049	0.2%	0.295	0.06%	0.268
6	1.4%	2.317	0.0%	0.009	0.09%	0.458
7	1.4%	2.280	0.0%	0.002	0.09%	0.462
8	1.4%	2.398	-0.3%	-0.523	0.08%	0.367
9	1.3%	2.055	-0.3%	-0.464	0.08%	0.374
10	1.1%	1.724	-0.3%	-0.418	0.06%	0.273
11	0.9%	1.419	-0.4%	-0.567	0.05%	0.221
12	0.8%	1.312	-0.5%	-0.733	0.06%	0.284
13	0.8%	1.317	-0.7%	-1.111	0.09%	0.453
14	0.8%	1.189	-0.8%	-1.206	0.07%	0.326
15	0.7%	1.015	-1.1%	-1.688	0.05%	0.215
16	0.8%	1.251	-1.4%	-2.075	0.07%	0.328
17	1.0%	1.467	-1.6%	-2.332	0.10%	0.579
18	0.9%	1.394	-1.4%	-2.093	0.09%	0.468
19	1.0%	1.528	-1.3%	-1.869	0.06%	0.281
20	1.0%	1.455	-1.4%	-2.087	0.08%	0.374
21	1.1%	1.511	-1.4%	-2.080	0.06%	0.268
22	1.2%	1.671	-1.3%	-1.854	0.07%	0.347
23	1.2%	1.729	-1.4%	-2.007	0.09%	0.436
24	1.3%	1.853	-1.2%	-1.615	0.11%	0.659
25	1.3%	1.772	-1.1%	-1.493	0.10%	0.551
26	1.3%	1.740	-1.1%	-1.552	0.12%	0.649
27	1.3%	1.716	-1.5%	-1.979	0.13%	0.716
28	1.3%	1.689	-1.5%	-2.074	0.15%	0.964
29	1.2%	1.664	-1.5%	-2.000	0.14%	0.783
30	1.1%	1.520	-1.4%	-1.808	0.13%	0.731

Note: Table 5.7: reports significance tests for Cumulative Average Abnormal Return (CAAR) for post-event window with t-statistics on abnormal returns. The results are statistically significant.

Figure 5.1: CAR (+/- 30 days around the transaction day) for insider and outsider from April 2007 to March 2015



Note: Figure 5.1: shows the CAAR (+/- 30 days around the trade day) for insiders and outsider group from April 2007 to March 2014.

CHAPTER 6

INSIDER TRADING AND STOCK MARKET CRASHES

6.1 INTRODUCTION

The fourth and final objective of the research deals with the connection between insider trading and excessive market movements like crashes and rallies in the stock prices. As argued by Marin and Olivier (2008), this line of research is related to two strands of research in finance i.e. insider trading and stock market crashes. Several extant studies have examined the question whether corporate insiders earn abnormal returns on their transactions. Specifically, insider purchase transactions earn positive abnormal return and sale transactions earn negative abnormal return thereby insiders earn abnormal profits or avoid losses. This line of research dates back to as early as Jaffe (1974) and Seyhun (1986) when they have documented that market is not efficient and insiders earn abnormal returns in their transactions. Studies like Chowdhury et al. (1993) and Pettit and Venkatesh (1995) also confirm the above-average profits earned by the insiders.

The phenomenon of insiders earning abnormal return has continued to garner academic interest in post-2000 as well. For example, Lakonishok and Lee (2001) have observed that insiders earn a positive abnormal return on portfolios with buy signal even after controlling for the standard measures of risk like size, momentum and book to market ratio. However, similar evidence was not recorded in the case of sale transactions. In the same manner, Jeng et al. (2003) documented that purchase transaction earning positive abnormal returns but not in the sale transactions. Overall, the extant literature documented an asymmetric response of the market to insider purchase and sale transactions.

Analysis of the stock market crash also has gained attraction in the last couple of decades. Behaviorists offer an explanation to the stock market crash and rally based on the underreaction and overreaction in prices. As argued by Hong and Stein (1999), market participants with private news fail to observe the news possessed by others

which lead to underreaction in prices. When momentum traders start chasing the momentum profits based on past data, they will earn profits but ultimately it leads to overreaction in prices. In the same manner, Hirshleifer (2001) has argued that expected return on securities is determined by risk and misvaluation. Therefore, the release of private information through the transactions by the insiders and coupled with momentum trading lead to the excessive movement in one direction leading to a rally in the stock prices or crash. Therefore, insider transactions and overall trading activity in the market may play an important role in explaining the movements in stock prices.

Excessive stock market movement is also explained from the point of uncertainty. For example, Gennotte and Leland (1990) have argued that when there is difference in the information possessed by different market participants that leads to a situation of illiquidity in the market. In such a situation, even a small shock can move the market in one direction as it affects the expected returns of the investors. Barlevy and Veronesi (2003) explain stock market crashes from the point of uninformed investors who precipitate the crisis by following the price movement in the market. In the same manner, Yuan (2005) has argued that correlation among asset prices increases during a market decline, as a result, a shock to fundamental may exacerbate the crisis due to high correlation. Therefore, the market crash research from this angle tries to explain the possibility of a crash from the point of risk where even a small shock may lead to large movement in the stock prices.

Extant literature on insiders earning abnormal return and stock market crash research from the angle of behaviorists and uncertainty angle provides a framework to analyze the role of insiders in causing rally or crash in the stock prices. As insiders have private information, transactions by the insiders may convey different information to the market contrary to the perception of the rest of the market participants, therefore, it may lead to illiquidity or uninformed investors may follow the insiders. Marin and Olivier (2008) have combined these approaches to explain the role of insider trading in causing rally or crash in the stock prices.

This chapter aims to investigate the insider purchase and sale transactions ahead of market crashes and rallies. As Marin and Olivier (2008) by using the data of the stocks traded in NYSE, AMEX and NASDAQ during the period 1986 to 2002 have noted that insiders sell more 10 months ahead of the market crash and insiders purchase more only a month before the rally in the market. This chapter tries to examine whether the same pattern is followed in the emerging markets like India or is there any difference in the trading pattern.

The present study uses the Marin and Olivier (2008) framework to analyze the role of insider trading in causing rally or crash in the stock prices. The study constructs the variables at a monthly frequency and uses logistic regression approach. The study recognizes crash and rally in stock prices at the firm level. The insider transactions are obtained from the disclosures made to the BSE under SEBI, (Prohibition of Insider Trading) Regulations, 1992. The study uses the Fama and French (1993) and Carhart (1997) four-factor asset pricing model and panel logistic regression in the present study.

The results are similar to the prior research of Marin and Olivier (2008), which states that insider sales are more before the market crash and insider purchases are more before the rally in the market, which is contrary to the many prior studies which documented that insider sales are for diversification and liquidity (Lakonishok and Lee 2001). It can be differentiated by opportunistic trades and routine trades (Cohen et al, 2012). Insider sales convey negative information to the market, and they are significantly associated with crashes. The crash arises after insiders have stopped trading.

6.2 DATA AND METHODOLOGY

The study collects data from two major data sources for the analysis. First, company level data is collected from CMIE Prowess database. It provides data on market capitalization, book value per share, shares outstanding, the quantity of shares traded, and number of transactions. Second, insider transactions are obtained from the disclosures made to the BSE under SEBI (Prohibition of Insider Trading) Regulations,

1992, for the period April 2007 to March 2015. The study uses the open market transactions only. There are about 99,732 open-market insider transactions, out of which 61,401 are purchase transactions and 38,331 are sale transactions. The transactions with missing data are eliminated from the analysis. The insider purchase and sale transactions are clustered at firm level on a monthly basis and a balanced panel data set is created accordingly. There are total 99 months as shown in the figures 6.1 and 6.2.

To calculate the expected return and abnormal return, the study uses a multifactor asset pricing model in line with Fama and French (1993), and Carhart (1997) model. The portfolios are constructed for all the BSE listed companies based on size, book-to-market equity (BE/ME) and momentum factors. Size category consists of Small (S), Medium (M), and Big (B) portfolios, where companies with market capitalization of the bottom 30 percent are considered as Small (S), 30 to 70 percent are considered as Medium (M), and 70 to 100 percent are considered as Big (B) portfolios. In the similar way, based on the book-to-market equity; High (H), Medium (M), and Low (L) category is formed i.e., top 30 percent are considered as High BE/ME (H), 30 to 70 percent as Medium BE/ME (M) and bottom 30 percent as Low BE/ME (L) portfolios. For momentum category, top 30 percent are considered as high momentum (HM) and 30 to 70 percent as Medium momentum (MM) and bottom 30 percent as low momentum (LM) portfolios.

Based on the interaction of three categories in size, book-to-market equity (BE/ME) and momentum factors, total 27 portfolios are created. For example, the small stock portfolio is constructed with similar weights of BE/ME ratio and momentum as S/H/LM, S/H/MM, S/H/HM, S/M/LM, S/M/MM, S/M/HM, S/L/LM, S/L/MM, and S/L/HM. In the same manner, medium and big size companies also have a total nine portfolios each with similar weights of BE/ME ratio and momentum factors. From these portfolios, SMB is arrived at by taking the simple arithmetic average difference between the returns of three Small and Big size portfolios, HML as the difference between the three High and Low BE/ME portfolios and WML as the difference between three High Momentum (Winners) and Low Momentum (Losers) portfolios. The return of the SMB portfolios should be largely free from the influence of the

BE/ME ratio and momentum, HML portfolio from size and momentum, and WML portfolio from the size and BE/ME ratio. A market index is built based on the returns of the BSE-listed firms.

The four-factor asset pricing model is used in the present study. The equation is specified as follows:

$$(R_{it} - R_{ft}) = \alpha_i + \beta_1(R_{mt} - R_{ft}) + \beta_2SMB_{mt} + \beta_3HML_{mt} + \beta_4WML_{mt} + \varepsilon_t \quad (6.1)$$

where R_{it} is the daily return on a stock i at time t , R_{ft} is the daily interest rate of government dated securities at time t . R_{mt} is the return on the constructed market index⁸ at time t . SMB_{mt} (Small minus Big) is the return on a portfolio of small stocks minus the return on a portfolio of big stocks. HML_{mt} (High minus Low) is the return on a portfolio of stocks with a high book to market value of equity minus the return on a portfolio of stocks with low book to market values. WML_{mt} (Winners minus Losers) is the return of the portfolio of stocks with high momentum minus the return on a portfolio of stocks with low momentum. ε_t is the error term in the regression.

A. Construction of variables:

The study constructs the crash and rally variables at the firm level. The crash variable is constructed based on the actual return as well as abnormal return. Abnormal Return (ABR) is calculated as the difference between actual return and expected returns calculated from the equation (6.1). Then, the standard deviation of ABR is calculated across a rolling window of the last 60 months data. The crash variable is identified at the individual company level and is defined as a binary variable ‘1’ if there is a crash in returns or ‘0’ if there is no crash. In other words, $ABRCRASH_{i,t}$ takes value 1 when the abnormal return of stock i in the month t is two standard deviations below the monthly abnormal return of that stock in the past 60 months, and takes value zero otherwise. Construction of crash variable is similar to the work of Marin and Olivier

⁸A value weighted market index return is calculated by multiplying the value weight of an individual company with the return.

(2008). The crash variable for stock i in the month t , $ABRCRASH_{i,t}$ is specified as follows:

$$ABRCRASH_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ABR} - \bar{r}_{i,t}^{ABR} \leq -2\sigma_{i,t}^{ABR}; \\ 0, & \text{otherwise.} \end{cases}$$

Further, the crash variable is created based on actual returns and it is defined as $ACTCRASH_{i,t}$. It is created in the same manner as in the case of abnormal returns. It is specified as follows:

$$ACTCRASH_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ACT} - \bar{r}_{i,t}^{ACT} \leq -2\sigma_{i,t}^{ACT}; \\ 0, & \text{otherwise.} \end{cases}$$

Rally in stock prices is called as ‘jump’ and it is identified at the individual company level. Jump defined as a binary variable, ‘1’ if there is a jump in returns or ‘0’ if there is no jump. In other words, $ABRJUMP_{i,t}$ takes the value 1 when the abnormal return of stock i in the month t is two standard deviations above the monthly abnormal return of that stock in the past 60 months, and takes the value 0 otherwise. It is specified as follows:

$$ABRJUMP_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ABR} - \bar{r}_{i,t}^{ABR} \geq 2\sigma_{i,t}^{ABR}; \\ 0, & \text{otherwise.} \end{cases}$$

In the same manner, jump variable is identified based on the actual returns as well. It is specified as follows:

$$ACTJUMP_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ACT} - \bar{r}_{i,t}^{ACT} \geq 2\sigma_{i,t}^{ACT}; \\ 0, & \text{otherwise.} \end{cases}$$

To homogenize the variables, the insider trading variables i.e. rupee value of the individual trade is divided by the market capitalization of the stock. It is calculated using the monthly closing price of each stock. The independent variables such as trading volume and past returns are recommended by the existing literature and are included in the present study as well.

The study estimates crash and jump preliminary regressions with insider trade related information as well as market wide traded related information. The study estimates four models separately, two for crash based on actual and abnormal return and two for the jump based on the actual and abnormal return. The equations are specified as follows:

ABRCRASH/ACTCRASH

$$\begin{aligned}
&= \text{Log}[P_{it}/1 - P_{it})] = \alpha_0 + \beta_1 \text{INTV}_{t-1} + \beta_2 \text{INTV}_{t-2,t-12} \\
&+ \beta_3 24\text{ABR}_{t-1,t-24} + \beta_4 \text{TOTTV}_{t-1} + \beta_5 \text{TOTTV}_{t-2,t-12} \\
&+ \varepsilon_i \quad (6.2)
\end{aligned}$$

ABRJUMP/ACTJUMP

$$\begin{aligned}
&= \text{Log}[P_{it}/1 - P_{it})] = \alpha_0 + \beta_1 \text{INTV}_{t-1} + \beta_2 \text{INTV}_{t-2,t-12} \\
&+ \beta_3 24\text{ABR}_{t-1,t-24} + \beta_4 \text{TOTTV}_{t-1} + \beta_5 \text{TOTTV}_{t-2,t-12} \\
&+ \varepsilon_i \quad (6.3)
\end{aligned}$$

The dependent variable is crash in equation (6.2) based on actual and abnormal return, whereas jump in equation (6.3) based on actual and abnormal return. The independent variables are INTV_{t-1} which is the total amount of insider trading volume on stock i during month $t-1$ and $\text{INTV}_{t-2,t-12}$ is the average monthly quantity of insider trading on stock i between month $t-1$ and month $t-12$. $24\text{ABR}_{t-1,t-24}$ is the past 24 months abnormal return in the stock excluding the current month. The study employs the total trading volume in the stock represented as $\text{TOTTV}_{i,t-1}$ which is previous month's total trading volume and $\text{TOTTV}_{t-2,t-12}$ is the average monthly quantity of total trading on stock i between month $t-1$ and month $t-12$. The study uses the panel logistic regression approach to estimate the equation (6.2) and (6.3).

The study estimates the market crash regression to directly estimate the impact of insider sales on crash. For this purpose, the study regresses the variables of crash, $\text{ABRCRASH}_{i,t}$ and $\text{ACTCRASH}_{i,t}$, against insider sales in the previous month $\text{INSALE}_{i,t-1}$ and the average insider sales in the past twelve months, $\text{INSALE}_{i,t-2,t-12}$. The study further includes the past 24 months cumulative abnormal returns, $24\text{ABR}_{i,t-1,t-24}$, the total trading volume (of insiders and outsiders) of the

past month, $TOTTV_{t-1}$ and past 12 months average trading volume excluding the previous month $TOTTV_{t-2,t-12}$. It is expected that the sign on the $INSALE_{t-2,t-12}$ is positive and greater than one, which implies that insiders trade much before the actual crash and insiders stop trading before the crash as the sign on $INSALE_{t-1}$ is also positive but less than one. The specification of the equation is as follows:

ABRCRASH/ACTCRASH

$$\begin{aligned}
&= \text{Log}[P_{it}/1 - P_{it}]) = \alpha_0 + \beta_1 INSALE_{t-1} + \beta_2 INSALE_{t-2,t-12} \\
&+ \beta_3 24ABR_{t-1,t-24} + \beta_4 TOTTV_{t-1} + \beta_5 TOTTV_{t-2,t-12} \\
&+ \varepsilon_i \quad (6.4)
\end{aligned}$$

The study estimates the impact of insider purchases on the market jump based on jump variable $ABRJUMP_{i,t}$ and $ACTJUMP_{i,t}$ against the last month's insiders purchases, $INPUR_{i,t-1}$, and the average purchases by insiders in the past twelve months, excluding the last month purchases $INPUR_{i,t-2,t-12}$. As earlier, the specification incorporates the previous 24 months cumulative abnormal returns, $24ABR_{i,t-1,t-24}$, the total trading volume (of insiders and outsiders) of the past one month, $TOTTV_{i,t-1}$, and past one year's average monthly trading volume excluding past month, $TOTTV_{t-2,t-12}$. The equation is specified as follows:

ABRJUMP/ACTJUMP

$$\begin{aligned}
&= \text{Log}[P_{it}/1 - P_{it}]) = \alpha_0 + \beta_1 INPUR_{t-1} + \beta_2 INPUR_{t-2,t-12} \\
&+ \beta_3 24ABR_{t-1,t-24} + \beta_4 TOTTV_{t-1} + \beta_5 TOTTV_{t-2,t-12} \\
&+ \varepsilon_i \quad (6.5)
\end{aligned}$$

6.3 EMPIRICAL RESULTS

The figure 6.1 shows the total number of market crashes for all the stocks traded in BSE on a financial year basis. In the initial two financial years (2007-2008, 2008-2009) the crash based on actual return is more than crash based on abnormal return, whereas in the rest of the period, crash based on abnormal return is more than the actual return. The number of the market crash are more in number in the initial two years of the study period and last two years (2013-14 and 2014-15) as well. The figure

6.2 shows the total number of market jumps for all the stocks traded in BSE on a financial year basis. There are more than 2000 instances of stocks recording jump in 2007-08, 2009-10, and 2013-14, 2014-15. Less than 1000 jumps are recorded in rest of the study period. The summary statistics of the variables used in the model is presented in Table 6.1. Stock return related variables are in percentages and volume related variables are presented as a ratio of the traded volume to the total number of shares outstanding. Insider trading volume, purchase, and sale volume are less than 5% of the total shares outstanding.

The study uses logistic regression to answer the question; do crashes or jumps occur when insider gets into or out of the market? Table 6.2 presents the coefficients and the odds ratios of the market crash logistic regression. Columns 1 and 2 present the coefficients and odds ratios of the logistic regression which identifies the dependent variable market crash based on abnormal return. Further, columns 3 and 4 present the corresponding results for the dependent variable identified based on actual return. Insider trading volume in the previous month has a negative coefficient and is statistically significant in case of crash defined based on both abnormal and actual returns. It indicates that insiders opt out of the market just before the occurrence of a crash. Further, past one-year insider trading volume is not statistically significant in case of both regressions. Past 24 months abnormal return is positively related to crash based on abnormal return, it indicates a reversal pattern in returns. Previous month's total trading volume is positive and significant in case of both regressions, whereas past twelve months trading volume is insignificant in the case of crash variable identified based on the abnormal return and positively significant at 10% level in the case of crash variable identified based on the actual return. Comparison of the past month's trading volumes of insiders and total trading volume indicates that insiders go out of the market before the onset of the crash, whereas, other traders actively trade in the market.

Table 6.3 presents the coefficients and the odds ratios of the market jump logistic regression. Columns 1 and 2 present the coefficients and odds ratios of the logistic regression which identifies the dependent variable market jump based on abnormal return. Further, columns 3 and 4 present the corresponding results for the dependent

variable identified based on the actual return. Insider trading volume in the past month is negatively related to market jump, whereas, past twelve months insider trading volume excluding the previous month trading volume is positively related. Past 24-months abnormal return has a negative relation with market jump based on the abnormal returns indicating a market reversal. However, jump defined based on actual return contradicts this finding with a positive and significant coefficient. Previous month's total trading volume is positively related to jump, whereas, past twelve months total trading volume is negatively related to jump. Findings of the market jump regressions further substantiate the findings of the market crash regression that insiders withdraw from the market just ahead of a jump as indicated by the previous month's insider trading volume. However, they are actively buying the stock over past twelve months period. In contrast, the total trading volume presents a completely opposite picture, total trading volume in the past month is positively related and past twelve months trading volume is negatively related indicating that insiders are better informed than ordinary investors.

Table 6.4 provides the results of the logistic regression of crashes on insider sales. As before, the first and second column contains the results of crash identified based on abnormal return and the third and fourth column based on the actual return. Previous month's insider sales is negatively related to the market crash, whereas, past twelve months sales is not statistically significant. Further, past 24 months abnormal returns are positively related to the market crash. Finally, previous month's total trading volume is positively related to the market crash and past twelve months total trading volume being statistically insignificant. Findings once again support the observations made based on the baseline regression on market crash.

Table 6.5 presents the results of the market jump logistic regression. As in earlier tables, columns 1 and 2 present the coefficients and odds ratios of the logistic regression which identifies the dependent variable market jump based on abnormal return and columns 3 and 4 based on the actual return. Previous month's insider purchase is having a positive relationship with a jump but the relationship is not statistically significant. Past twelve months insider purchases are positively related to market jump indicating insiders actively purchase before the market jump. Previous

24 months abnormal return is having a negative relationship with market jump indicating reversal pattern. However, the same coefficient in the regression of jump identified based on actual return contradicts this finding. Total trading volume in the previous month is not statistically significant. Finally, past twelve months trading volume is negatively related to the jump. This coefficient along with the past twelve months insider purchase confirms that insiders actively buy in companies when rest of the market is not interested. Therefore, it seems that insiders have an information advantage over rest of the market.

6.4 CONCLUSION

This study explores the relationship between insider trading and stock market crashes in India. The prior scholastic arena and practitioners draw a significant amount of attention towards insider trading and crash in the asset prices. The study has adopted Carhart (1997) model to estimate the abnormal returns and subsequently crash and jump variables are constructed in line with Marin and Olivier (2008). Insiders withdraw from the market just ahead of jump or crash. Therefore, it seems that insiders have an information advantage over the rest of the market. These findings shed light on the informative role of insider sales.

Table 6.1: Summary Statistics

Variables	N	Minimum	Maximum	Mean	Std. Deviation
<i>Actual Return(ACT)</i>	210078	-2.765	4.405	0.005	0.166
<i>Abnormal Return (ABR)</i>	210078	-5.110	4.405	0.005	0.181
$INTV_{t-1}$	222552	0	4.068	0.001	0.021
$INTV_{t-2,t-12}$	222552	0	0.354	0.001	0.006
$24ABR_{t-1,t-24}$	157028	-0.369	0.296	0.003	0.032
$TOTTV_{t-1}$	214335	0	4.069	0.003	0.022
$TOTTV_{t-2,t-12}$	210005	0	0.304	0.003	0.007
$INSALE_{t-1}$	222552	0	1.254	0.001	0.012
$INSALE_{t-2,t-12}$	197829	0	0.364	0.001	0.004
$INPUR_{t-1}$	222552	0	4.068	0.001	0.013
$INPUR_{t-2,t-12}$	197829	0	0.441	0.001	0.004

Note: Table 6.1 presents the summary statistics of the variables used in the model. Insider trading volume, $INTV_{i,t}$ as the amount of insider purchases and insider sales for the last month $INTV_{t-1}$ and $INTV_{t-2,t-12}$ for the last 12 months. The past 24 months abnormal returns $24ABR_{t-1,t-24}$, and the total trading volume (of insiders and outsiders) of the past month $TOTTV_{t-1}$ and $TOTTV_{t-2,t-12}$ for the last 12 months. $INSALE_{i,t-1}$ which is the total amount of insider sales on stock i during month t , $INSALE_{t-2,t-12}$ for the last 12 months. , $INPUR_{i,t-1}$ which is the total amount of insider purchases on stock i during month t and $INPUR_{t-2,t-12}$ for the last 12 months.

Table 6.2: Insiders Trading Volume and Crashes

ABRCRASH/ACTCRASH

$$= \text{Log}[P_{it}/1 - P_{it}] = \alpha_0 + \beta_1 \text{INTV}_{t-1} + \beta_2 \text{INTV}_{t-2,t-12} + \beta_3 24\text{ABR}_{t-1,t-24} + \beta_4 \text{TOTTV}_{t-1} + \beta_5 \text{TOTTV}_{t-2,t-12} + \varepsilon_i$$

Dependent Variable	<i>ABRCRASH</i>		<i>ACTCRASH</i>	
	(1) Coefficient	(2) Odds Ratio	(3) Coefficient	(4) Odds Ratio
<i>INTV</i> _{<i>t</i>-1}	-3.903 (0.001)	0.020	-6.216 (0.002)	0.002
<i>INTV</i> _{<i>t</i>-2,<i>t</i>-12}	5.801 (0.197)	330.486	-6.895 (0.156)	0.001
<i>24ABR</i> _{<i>t</i>-1,<i>t</i>-24}	4.709 (0.000)	110.985	-0.101 (0.875)	0.903
<i>TOTTV</i> _{<i>t</i>-1}	4.599 (0.000)	99.340	3.823 (0.002)	45.749
<i>TOTTV</i> _{<i>t</i>-2,<i>t</i>-12}	-4.929 (0.281)	0.007	7.041 (0.097)	1142.677
Constant	-3.606 (0.000)	0.027	-4.146 (0.000)	0.015

Note: The *p*-value of the coefficient is presented in the parenthesis. The measures of crash are, *ABRCRASH*_{*i,t*} and *ACTCRASH*_{*i,t*}, as the yardstick of insider trading action. The previous month's insiders trading volume *INTV*_{*i,t*-1}, and the average monthly insider trading volume in the previous 12 months excluding the last month, *INTV*_{*t*-2,*t*-12}, the past 24 months abnormal returns *24ABR*_{*t*-1,*t*-24}, and the total trading volume (of insiders and outsiders) of the past month *TOTTV*_{*t*-1}. The average monthly total trading volume in the previous 12 months excluding the last month, *TOTTV*_{*t*-2,*t*-12}.

Table 6.3: Insiders Trading Volume and Jumps

ABRJUMP/ACTJUMP

$$= \text{Log}[P_{it}/1 - P_{it}] = \alpha_0 + \beta_1 \text{INTV}_{t-1} + \beta_2 \text{INTV}_{t-2,t-12} + \beta_3 24\text{ABR}_{t-1,t-24} + \beta_4 \text{TOTTV}_{t-1} + \beta_5 \text{TOTTV}_{t-2,t-12} + \varepsilon_i$$

Dependent Variable	<i>ABRJUMP</i>		<i>ACTJUMP</i>	
	(1) Coefficient	(2) Odds Ratio	(3) Coefficient	(4) Odds Ratio
<i>INTV</i> _{<i>t</i>-1}	-0.827 (0.629)	0.437	-3.158 (0.067)	0.043
<i>INTV</i> _{<i>t</i>-2,<i>t</i>-12}	38.500 (0.000)	5.254E	46.102 (0.000)	1.052E
<i>24ABR</i> _{<i>t</i>-1,<i>t</i>-24}	-0.728 (0.064)	0.483	1.432 (0.001)	4.187
<i>TOTTV</i> _{<i>t</i>-1}	3.391 (0.048)	29.695	5.379 (0.000)	216.745
<i>TOTTV</i> _{<i>t</i>-2,<i>t</i>-12}	-39.522 (0.000)	-6.85194E	-51.777 (0.000)	-3.26238E
Constant	-3.042 (0.000)	0.048	-3.207 (0.000)	0.040

Note: The *p*-value of the coefficient is presented in the parenthesis. The measures of jump are, *ABRJUMP*_{*i,t*} and *ACTJUMP*_{*i,t*}, as the yardstick of insider trading action. The previous month's insiders trading volume *INTV*_{*i,t*-1}, and the average monthly insider trading volume in the previous 12 months excluding the last month, *INTV*_{*t*-2,*t*-12}, the past 24 months abnormal returns *24ABR*_{*t*-1,*t*-24}, and the total trading volume (of insiders and outsiders) of the past month *TOTTV*_{*t*-1}. The average monthly total trading volume in the previous 12 months excluding the last month *TOTTV*_{*t*-2,*t*-12}.

Table 6.4: Insiders Sales and Crashes

ABRCRASH/ACTCRASH

$$= \text{Log}[P_{it}/1 - P_{it}]) = \alpha_0 + \beta_1 \text{INSALE}_{t-1} + \beta_2 \text{INSALE}_{t-2,t-12} + \beta_3 24\text{ABR}_{t-1,t-24} + \beta_4 \text{TOTTV}_{t-1} + \beta_5 \text{TOTTV}_{t-2,t-12} + \varepsilon_i$$

Dependent Variable	<i>ABRCRASH</i>		<i>ACTCRASH</i>	
	(1) Coefficient	(2) Odds Ratio	(3) Coefficient	(4) Odds Ratio
<i>INSALE</i> _{t-1}	-1.713 (0.216)	0.180	-6.352 (0.062)	0.001
<i>INSALE</i> _{t-2,t-12}	4.972 (0.211)	144.386	-5.964 (0.335)	0.002
<i>24ABR</i> _{t-1,t-24}	4.678 (0.000)	107.519	-0.260 (0.686)	0.771
<i>TOTTV</i> _{t-1}	1.327 (0.017)	3.770	0.693 (0.198)	1.998
<i>TOTTV</i> _{t-2,t-12}	-2.799 (0.361)	0.060	3.259 (0.299)	26.033
Constant	-3.576 (0.000)	0.027	-4.105 (0.000)	0.016

Note: The *p*-value of the coefficient is presented in the parenthesis. The variables of crash, *ABRCRASH*_{*i,t*} and *ACTCRASH*_{*i,t*}, against insider sales in the previous month *INSALE*_{*i,t-1*} and the average insider sales in the past 12 months, *INSALE*_{*i,t-2,t-12*}. Further the study included the past 24 months cumulative abnormal returns, *24ABR*_{*i,t-1,t-24*} and the total trading volume (of insiders and outsiders) of the past month, *TOTTV*_{*t-1*}. The average monthly total trading volume in the previous 12 months excluding the last month, *TOTTV*_{*t-2,t-12*}.

Table 6.5: Insiders Purchases and Jumps

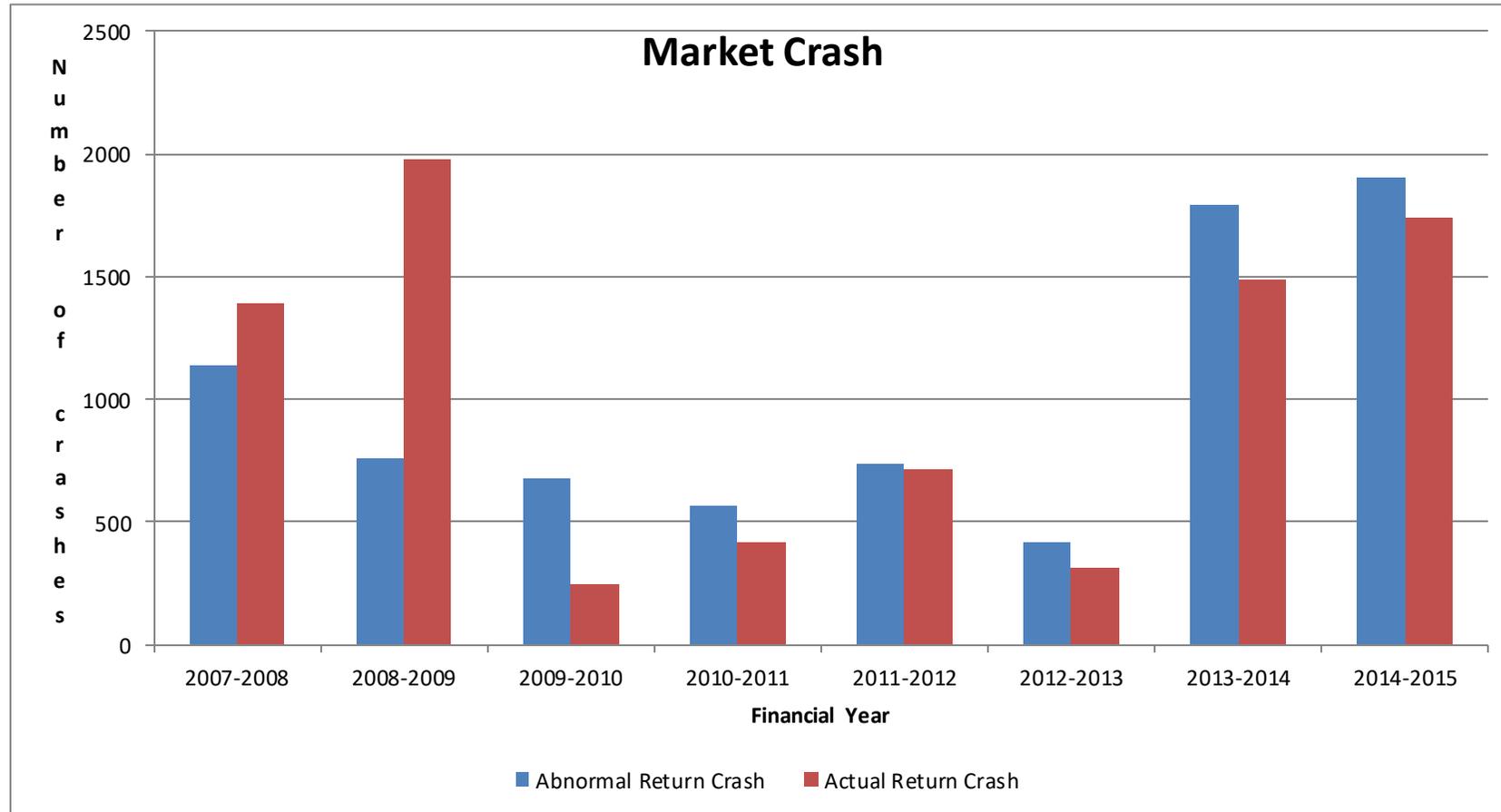
ABRJUMP/ACTJUMP

$$= \text{Log}[P_{it}/1 - P_{it}] = \alpha_0 + \beta_1 \text{INPUR}_{t-1} + \beta_2 \text{INPUR}_{t-2,t-12} + \beta_3 24\text{ABR}_{t-1,t-24} + \beta_4 \text{TOTTV}_{t-1} + \beta_5 \text{TOTTV}_{t-2,t-12} + \varepsilon_i$$

Dependent Variable	<i>ABRJUMP</i>		<i>ACTJUMP</i>	
	(1) Coefficient	(2) Odds Ratio	(3) Coefficient	(4) Odds Ratio
<i>INPUR</i> _{t-1}	0.816 (0.617)	2.261	2.255 (0.278)	9.536
<i>INPUR</i> _{t-2,t-12}	10.317 (0.000)	30229.81	10.174 (0.000)	26202.34
<i>24ABR</i> _{t-1,t-24}	-0.664 (0.091)	0.514	1.454 (0.001)	4.279
<i>TOTTV</i> _{t-1}	-0.301 (0.785)	0.739	-1.417 (0.350)	0.242
<i>TOTTV</i> _{t-2,t-12}	-8.336 (0.001)	-0.000	-13.533 (0.000)	0.000
Constant	-3.037 (0.000)	0.048	-3.206 (0.000)	0.040

Note: The *p*-value of the coefficient is presented in the parenthesis. The regression for the measures of jump variable *ABRJUMP*_{*i,t*} and *ACTJUMP*_{*i,t*} against the last month's insiders purchases, *INPUR*_{*i,t-1*}, and the average purchases by insiders in the past 12 months, excluding the last month purchases *INPUR*_{*i,t-2,t-12*}. The previous 24 months cumulative abnormal returns, *24ABR*_{*i,t-1,t-24*}, the total trading volume (of insiders and outsiders) of the past one month, *TOTTV*_{*i,t-1*}. The average monthly total trading volume in the previous 12 months excluding the last month, *TOTTV*_{*t-2,t-12*}.

Figure 6.1: Market crash



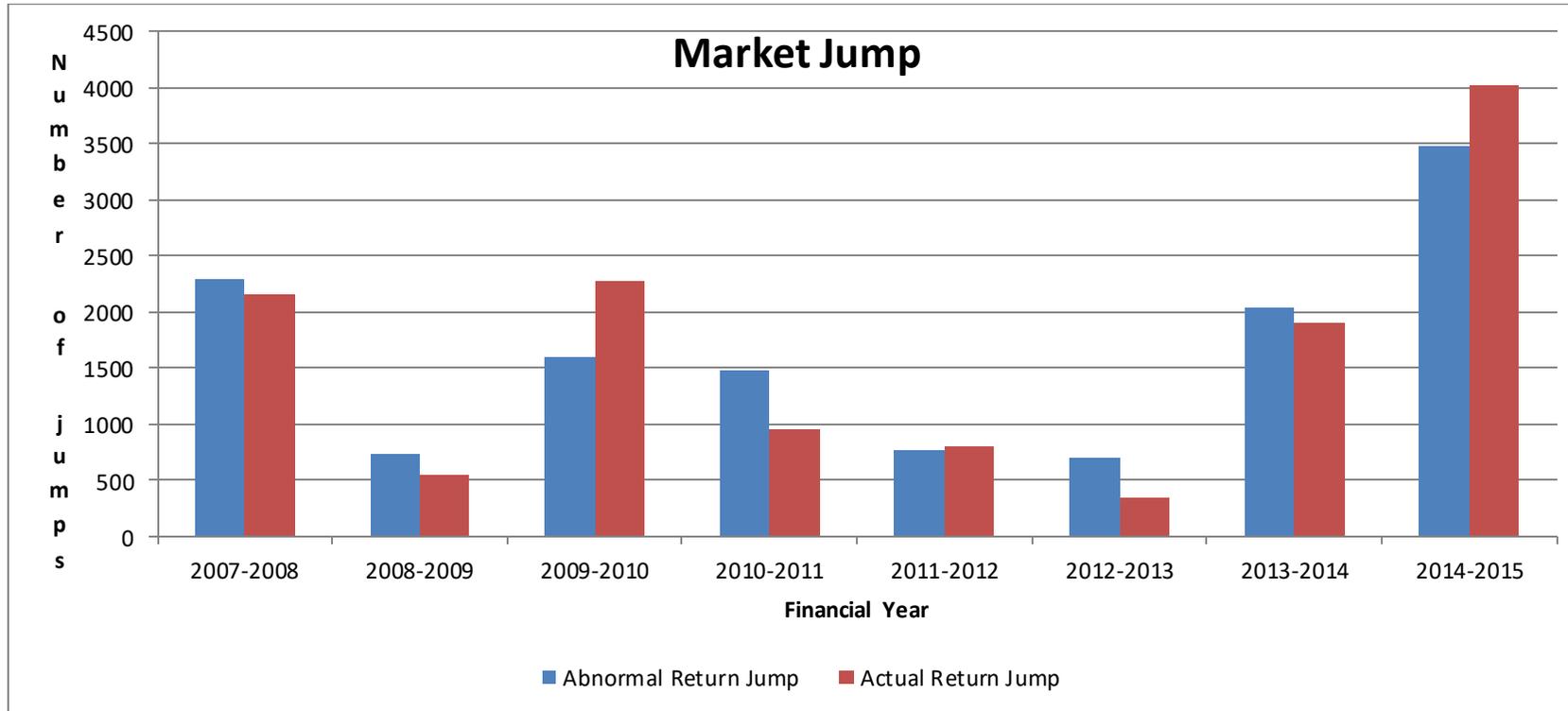
Note: The figure shows the aggregate number of market crashes for all the stocks traded in BSE on a financial year basis. The figure is based on the following definitions of the crash.

$$ABRCRASH_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ABR} - \bar{r}_{i,t}^{ABR} \leq -2\sigma_{i,t}^{ABR}; \\ 0, & \text{otherwise.} \end{cases}$$

$$ACTCRASH_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ACT} - \bar{r}_{i,t}^{ACT} \leq -2\sigma_{i,t}^{ACT}; \\ 0, & \text{otherwise.} \end{cases}$$

The crash variable is created based on the abnormal return as well as actual return. The study used four-factor asset pricing model to calculate the expected return. Abnormal Return (ABR) is calculated as the difference between actual return and expected returns. Then, computed the standard deviation of ABR, across a rolling window of the last 60 months, or 5 years of data. The crash variable is identified at the individual company level and defined as a binary variable. (1 if there is crash returns or 0 if there is no crash). In other words $ABRCRASH_{i,t}$ considers the value one when the abnormal return of stock i in the month t is less than two standard deviations below the monthly abnormal return of that stock in the past 60 months, and considers the value zero otherwise. Similar for $ACTCRASH_{i,t}$ variable also.

Figure 6.2: Market jump



Note: The figure shows the aggregate number of market jumps for all the stocks traded in BSE on a financial year basis. The figure is based on the following definitions of jumps.

$$ABRJUMP_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ABR} - \bar{r}_{i,t}^{ABR} \geq -2\sigma_{i,t}^{ABR}; \\ 0, & \text{otherwise.} \end{cases}$$

$$ACTJUMP_{i,t} = \begin{cases} 1, & \text{if } r_{i,t}^{ACT} - \bar{r}_{i,t}^{ACT} \geq -2\sigma_{i,t}^{ACT}; \\ 0, & \text{otherwise.} \end{cases}$$

The jump variable is created based on the abnormal return as well as actual return. The study used four-factor asset pricing model to calculate the expected return. Abnormal Return (ABR) is calculated as the difference between actual return and expected returns. Then, computed the standard deviation of ABR, across a rolling window of the last 60 months, or 5 years of data. The jump variable is identified at the individual company level and defined as a binary variable. (1 if there is jump or 0 if there is no jump). In other words $ABRJUMP_{i,t}$ considers the value one when the abnormal return of stock i in the month t is greater than two standard deviations below the monthly abnormal return of that stock in the past 60 months, and considers the value zero otherwise. Similar for $ACTJUMP_{i,t}$ variable also.

CHAPTER 7

SUMMARY AND FINDINGS

7.1 INTRODUCTION

Trading by the corporate insiders in the shares of their own company is the most common phenomena observed in the stock markets around the world. As insiders are in a position to have access to price sensitive information about the company, they may be in a position to benefit from this by trading in the shares of their own company which may compromise the interests of the ordinary investors. Therefore, most of the countries around the world have framed insider trading regulations to restrict such activities to create a level-playing field for the investors and other market participants. The process of regulating the insider trading initially started in the developed markets and later on spread to the present day emerging markets.

Insider is the one who is either a Promoter/Director/Officer and who has access to the private information of the company when compared to the general public. The information could be related to future plans of the company, significant events having implications for stock prices, corporate announcements, mergers, acquisitions etc. Insiders can trade on the private information they possess in their own company shares and earn abnormal returns or avoid losses. To prevent this and create a level playing field in the capital markets for the insiders and outsiders, the regulatory bodies prohibit insider trading. In India, the regulatory body for stock markets is SEBI. Under SEBI (Prohibition of insider trading regulations), 1992, the insiders have to disclose their purchase and sale transactions to the stock exchange where it is listed. If the insiders trade within the regulations and disclose the trades to the respective stock exchange are known as legal insider trading in the academic finance literature.

The advent of insider trading regulation and disclosures by the corporate insiders to the stock exchanges have led to the academic interest in the analysis of insider trading to find whether insiders benefit from their position. Extant studies have examined

various dimensions of the impact of insider trading on the stock market. For example, several studies on insider trading have found that insider trading is not random but follow a specific pattern when they purchase or sell shares. Their trading pattern may differ based on the size, BE/ME ratio, momentum, P/E ratio and other categories. Several extant studies have found that insiders earn abnormal returns when they trade, whereas it may not be possible for outsiders to mimic insider trading in their own portfolio and earn abnormal return. However, only very few studies have confirmed that not just insiders earn abnormal returns, outsiders can mimic insider trades and earn abnormal returns. Several studies have examined the information content of insider trading, insider purchases leading to positive abnormal return and insider selling leading to negative abnormal returns. There are also studies which have examined the role of insider trading in causing rallies and crashes in the stock prices.

Most of the studies on insider trading are largely concentrated on the developed markets and there is very limited number of studies on the present day emerging markets. There are differences in the institutional structure and insider trading regulations across countries. Further, the effectiveness of the insider trading also depends on the quality of the legal institutions in a particular country. Therefore, there is a compelling need to analyze the insider trading across countries which are unique in their own way. As far as India is concerned, there are very few studies on this issue. Various dimensions of the insider trading remain either unexplored or under-explored in the Indian context. Specifically, the broad-based market outcome of the insider trades and the information content of insider trading need further examination. Further, the determinants of insider trading strategies, its utility to ordinary investors and effect of insider trading on future market crashes and rallies largely remained unexplored.

The justification for the present study stems from the fact that there are very few studies on this subject with regard to the emerging markets. Since India is an important emerging market, the findings of the study will be of significance not just for domestic investors but for global investors as well. Since the study uses the insider trading disclosure data which is in public domain, the findings of the study have implications for ordinary investors. It is equally important for the regulators to see the

strategies pursued by the insiders may help them to devise the regulations accordingly. Therefore, it gives an opportunity to assess the effectiveness of insider trading regulations in creating a level playing field between insiders and outsiders.

The present study is divided into four objectives. The first objective deals with the determinants of insider trading. The study explores the insider trading pattern across various categories. The insider buys are more than the sales in the companies based on size, BE/ME ratio, momentum and P/E ratio categories. The study uses logistic regression framework to find the determinants of insider trading. Explanatory variables are selected from the insider trading disclosures and factors influencing stock returns which are identified from multifactor asset pricing models like Fama and French (1993) and Carhart (1997) models.

The second objective of the study is to assess the profitability of the insider trading strategies. The study creates portfolios based on standard strategies used in the stock market based on size, BE/ME ratio, and momentum as well as based on the direction of insider trading. For example, portfolios consisting only purchase and sale transactions are created and within purchase and sale transactions, the intensity of purchase and sale is measured by considering their positions as net buyers or sellers at the end of each quarter. Based on this, the study creates purchase and sale portfolios which have one to four purchase or sale transactions but no opposite transactions. Estimates of the abnormal returns to these portfolios obtained from the multifactor asset pricing models of the class of Fama and French (1993) and Carhart (1997) models. The study compares the performance of insider trading portfolios with similar market portfolios without the influence of the insider transactions.

The third objective of the study deals with the information content of insider trading separately for insider purchase and sales using event study methodology. Cumulative abnormal return is measured using a multifactor asset pricing model of the class of Fama and French (1993) and Carhart (1997) models. The study measures the CAR for insider purchases and sales around 30 days event window around insider trading. Further, the study analyses CAR for insider purchase and sale portfolios categorized based on size, BE/ME ratio, and momentum factors. A comparison of the insider

trading CAR with market CAR excluding insider returns in similar categories facilitates the comparison.

The final objective of the study investigates the role of insider trading is causing market crashes and rallies. Logistic regression is the methodology used in this objective where a crash or rally is defined as 1 otherwise 0. Stock market crash and rally are defined on the basis of both actual return and abnormal return following Marin and Olivier (2008). The study uses a multifactor asset pricing model in line with Fama and French (1993) and Carhart (1997) models to calculate the abnormal return.

7.2 NATURE AND SOURCE OF DATA

The study collects data from two sources, first, mandatory insider trading disclosures made to the BSE and stock price and market-related information from the CMIE Prowess database. Disclosures made under SEBI (Prohibition of Insider Trading) Regulations, 1992 consists of scrip name, the name of the acquirer or seller, transaction date, whether a transaction is purchase or sale, mode of purchase or sale, number of shares traded, holding after the transaction, regulation and reported to the exchange date. CMIE Prowess provides information on the stock price, market capitalization, book value of share, and stock index number. The study period ranges from April, 2007, to March 31, 2015.

7.3 FINDINGS

Following points summarize the overall findings of the study:

1. Descriptive statistics of the insider trading variables shows that there is a consistent rise in the insider transactions during the study period. The number of purchase transactions exceeds the sale transactions during the entire study period. However, the financial year 2014-15 is an exception to both statements. Insider transactions across different classifications confirm that insiders trade in large capitalization companies and companies with low BE/ME ratio. Based on momentum, insiders' purchases are more or less

uniformly distributed across all momentum categories, whereas sales are concentrated in high momentum category.

2. Empirical results of the first objective show that insiders seem to have a preference for large market capitalization companies, companies with low BE/ME ratio, high momentum, and low P/E ratio companies. Further, the number of shares traded is positively related to buying. Insider trading behavior varies across different class of insiders as reported under different regulations to the exchange. The insider trading behavior also changes over time which could be attributed to changes in the insider trading regulations and movements in the market. Overall, the model predicts 74.2 percent within the sample and 71.5 percent out of the sample.
3. The analysis of abnormal returns to insider trading strategies in the second objective shows that insider purchase portfolios earn positive abnormal return and sale portfolios earn negative abnormal return. Absolute size of the abnormal return is more when insiders trade decisively either by purchasing or selling only once. Abnormal return decreases as insiders trade more, indicating that insiders may not have decisive information about the future profitability of the company. However, outsider group does not earn significant abnormal return during the same period. Further, positive correlation between insider purchases and future return; negative return between insider sales and future return indicates the superior information processed by the insiders over the outsiders.
4. The third objective analyses the information content of insider trading using event study methodology. The empirical results show that insider purchase as well as sale portfolios earn positive abnormal return in the pre-event window, whereas purchase portfolio earns positive abnormal return and sale portfolio earns negative abnormal return in the post-event window. Classification of the portfolios based on size, BE/ME ratio and momentum as well as year wise classifications also confirm the abnormal returns to insider trading strategies. However, purchase transactions seem to have higher impact on abnormal returns in comparison with the sale transactions.

5. The final objective on the analysis of the role of insider trading in causing stock market crashes and rallies show that insider purchase and sales over a year's time play a major role in causing stock market jump and crash respectively. However, in both cases, insiders trading activity diminishes substantially just ahead of the crash or rally. Outsiders trading activity is exactly opposite to that of insiders, very less trading activity over the year and picks up just ahead of the crash.

The study is based on following four hypotheses:

1. The null hypothesis based on the first objective states that 'insider trading is random and does not follow any identifiable pattern', whereas the alternative hypothesis states that 'insider trading follows an identifiable pattern'. Empirical results show that more than 70 percent of the insider transactions is predicted based on standard investment strategies included as the explanatory variables in the model. Therefore, the null hypothesis of the first objective is rejected.
2. The null hypothesis of the second objective states that 'insider trading portfolios do not earn abnormal returns', whereas the alternative hypothesis states that 'insider trading portfolios earn abnormal returns'. Empirical results confirm that insider purchase portfolios earn a positive abnormal return, whereas sale portfolios earn a negative abnormal return. Therefore, the null hypothesis is rejected.
3. The third objective has a null hypothesis 'insider trading does not contain information to the market and as a result, it does not affect the price' whereas the alternative hypothesis states that 'insider trading does contain information to the market and as a result, it does affect the price'. Empirical results show that insider purchase portfolios earn a positive abnormal return in the post-event window, whereas sale portfolios earn a negative abnormal return. Therefore, the null hypothesis is rejected.
4. The null hypothesis of the fourth objective states that 'insider trading does not signal excessive market movement in form of crash and rallies', whereas the alternative hypothesis is 'insider trading does signal excessive market

movement in form of crash and rallies'. Empirical results confirm that insider purchases and sales have a significant impact on the future market rally and crash respectively. Therefore, the null hypothesis is rejected.

The theoretical framework of the study is based on the EMH and specifically related to the strong-form of the EMH. The overall findings of the study contradict the strong form EMH in the Indian context from the point of view of corporate insiders trading activity in the market. Almost all findings point out to predictability in the market outcome. However, as argued by the proponents of the EMH, a slight change in the methodology led to the disappearance of predictability. Therefore, before making an emphatic conclusion about the efficiency of Indian stock market, further corroborating evidence based on alternative methodologies and based on more dimensions of insider trading may be highly desirable.

7.4 IMPLICATIONS AND CONTRIBUTION TO THE BODY OF KNOWLEDGE

The present study provides a comprehensive analysis of the insider trading in Indian context from different dimensions of the impact of insider trading on the market. The results of the study confirm that several factors determine insider purchases and sales, some of these factors are standard investment strategies used by the market participants. Therefore, market participants can anticipate the direction of insider trading based on these determinants. The findings based on abnormal returns to insider trading and information content shows that not only insider purchase and sale portfolios earn positive and negative abnormal returns respectively, it also continues to move in the same direction in near future. Therefore, investors can avoid the stocks with insider sales and purchase those with insider purchases to avoid losses or earn profits. Results of the final objective on crash and rally show that continuous insider purchases and sales over a year's time indicate excessive movement in the stock prices, purchases leading to rally and sales leading to crash in stock prices. Further, insiders seem to withdraw from the market just ahead of crash or rally. However, outsiders seem to join the party after the rally or ahead of crash leading to either reduced profits or increased losses. Therefore, this finding may be used to devise an

investment strategy which tracks the movement of insiders trading to earn higher profits or avoid losses. Finally, there are significant regulatory implications as well, regulators can take a look at the existing regulations and fine tune the same in light of these findings.

The findings of the study will be of significance based on different parameters. First, most of the earlier research attempts in the Indian context have focused on specific issues like ownership structure, corporate governance, etc. and did not analyze insider trading in a comprehensive manner. Second, though the study of Chauhan et al. (2016) has analyzed insider trading in the Indian context, it is based on a proprietary data set of NSE of India. Therefore, it has limited utility for ordinary investors to devise trading strategies by following insider trading. Therefore, the present study based on a publicly available data set covering about eight years (2007-2015) has implications for regulators as well as ordinary investors. Further, this study has analyzed by far the longest period and includes almost all companies listed in the Indian stock market.

7.5 LIMITATIONS OF THE STUDY

Though the study has examined insider trading incorporating all listed companies as well as longer study period, there are a few limitations. Several existing studies have analyzed differences in the market outcomes when different categories of insiders trade in the market. However, in the Indian context, the exact position of the insiders such as CEO, CFO, etc. are not disclosed in the data set. Though the names of insiders are provided, it is difficult to individually identify the positions of insiders in a universe of more than 5000 companies over eight years period. However, different categories of insiders as identified by the regulation is used as an explanatory variable in the logistic regression. Finally, the scope of the present study is only legal insider trading. If any corporate insider trades in violation of the insider trading regulations, it is beyond the scope of the present study.

7.6 SCOPE FOR FURTHER RESEARCH

The limitations of the present study give scope for the future research. Future research can be carried out by considering the newly introduced SEBI (Prohibition of Insider Trading) Regulations, 2015. The new SEBI regulations specified various types of insiders viz., Director/Directors Immediate Relative, Employee/Employees Immediate Relative, Key Managerial Person, Promoter, Promoter and Director, Promoters Immediate Relative. Future study can assess the profitability of each category of insiders and their information content to evaluate the impact of the change in insider trading regulations.

7.7 CONCLUSION

Following the global trend of regulating the insider trading activity, India started the process of regulating insider trading activity by enacting SEBI (Prohibition of Insider Trading) Regulations, 1992. The major objective of the regulation is to create a level playing field so that the interest of the ordinary investors is not compromised. Extant studies in the global context have shown that in spite of the best efforts by the regulators, corporate insiders seem to exploit their access to sensitive information by earning abnormal returns on their portfolios. In this context, the present study analyses the trading activity of corporate insiders. Broadly, the study covers the determinants, profitability, and impact of insider trading activity on the stock market. A multifactor asset pricing model following Fama and French (1993) and Carhart (1997) forms the core methodology to estimate the expected and abnormal returns. Further, the study uses the event-study methodology and logistic regression models in the analysis. Data period of the study extends from April 2007 to March 2015, covering a total 8 years period. Disclosures of insider trading made by the corporate insiders to the BSE forms the core insider trading data set used in the study.

Empirical results of the study confirm that corporate insiders have an information advantage over rest of the market and they use this to their advantage. Insiders earn abnormal returns on their portfolios and it continues to persist for a reasonable time in the future. Further, insider trading is not random across different categories of stocks;

it follows a specific pattern and can be predicted using standard investment strategies used by the investors. Insider trading also helps in predicting the excessive movements in the stock prices. Findings also confirm that insiders trade very skillfully as they do not trade actively just ahead of a major movement in stock prices.

The findings of the study could help the individual investors to understand the dynamics of the insider trading since the data used in this study is in the public domain. Further, the results also can be helpful to the securities market regulator, SEBI and policymakers to understand the insider trading pattern across various stock categories and devise the regulations accordingly. If corporate insiders trade illegally, it is beyond the scope of the study. It would be thought-provoking to see if similar studies are conducted and inferences are drawn from the stock markets of the other developing economies as well.

This study supplements previous studies by investigating in emerging market; it presents interesting findings that are distinct from those witnessed by developed markets. Future research can be carried out to find the optimal trading strategies by considering the difference between the insider transaction date and the reporting date to the stock exchange. This study opens up various questions for the future studies to examine the impact of insider trading on the market, market participants, etc. The study emphasizes on the institutional and managerial implications of results i.e. the results are useful for investors, portfolio managers and policy makers in formulating the appropriate trading strategies and devising regulations.

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- (SEBI) (Prohibition of Insider Trading) Regulations, 1992.
- Companies Act, 2013
- Corporate Governance an Emerging Scenario, published by National Stock Exchange, 2010
- Sachar Committee Report
- The Companies Act, 1956
- Patel Committee Report
- Securities Contracts (Regulation) Act, 1956
- Abid Hussein Committee Report
- Indian Securities Market a Review, 2013, published by National Stock Exchange of India Ltd (NSE).

Brief bio-data of the Scholar

Personal Details

Name : M Anil Kumar
Fathers Name : M. Ashok Kumar
Gender : Male
Date of Birth : 11/11/1986
Marital status : Single
Languages Known : English, Hindi, Telugu
Correspondence Address : Xavier Institute of Management & Entrepreneurship
Electronics City, Phase II, Hosur Road,
Bangalore 560 100
Permanent Address : HNo 4-43/1/A, beside: Andhra Bank,
Kothapalli H Karimnagar,
Karimnagar-505 451
Telangana

Achievements

- Received 2nd Best Paper award for the paper titled “Legal Insider Trading Behaviour: Empirical Evidence from India” presented in “PhD Consortium 2015” organized by Shailesh J. Mehta School of Management, IIT Bombay during November 30th to December 1st, 2015.

Publications

- Manchikatla, A.K. and Acharya, R.H. (2017), “Insider trading in India – regulatory enforcement”, *Journal of Financial Crime*, 24(1), 48–55.
<http://dx.doi.org/10.1108/JFC-12-2015-0075>
(Indexed in Scopus and ABDC-‘C’ category journal, Publisher: Emerald Group Publishing)

Publications (Under Review)

- Manchikatla, A.K. and Acharya, R.H. (2017), “Information Content of Insider Trading: Empirical Evidence from India”, *Journal of Quantitative Economics*. (Indexed in Scopus and ABDC-‘B’ category journal, Publisher: Springer)
- Manchikatla, A.K. and Acharya, R.H. (2017), “Determinants of Legal Insider Trading: Empirical Evidence from India”, *Vikalpa: The Journal for Decision Makers*. (Indexed in Scopus, Journal by Indian Institute of Management-Ahmedabad, Publisher: Sage)
- Manchikatla, A.K. and Acharya, R.H. (2017), “Insider Trading and Stock Market Crashes: Evidence from India”, *Decision*. (Journal by Indian Institute of Management-Calcutta, Publisher: Springer)

Conferences in India (with conference proceedings)

1. Anil Kumar M. & Rajesh Acharya H. (2017), “An Empirical Analysis of Legal Insider Trading in India” paper presented in the “10th Doctoral Thesis Conference” organized by ICFAI Business School (IBS), Hyderabad, in collaboration with Indira Gandhi Institute of Development Research (IGIDR), Mumbai, during April 20th to April 21st, 2017.
2. Anil Kumar M. & Rajesh Acharya H. (2017), “Information Content of Insider Trading: Empirical Evidence from India” paper presented in “International Conference on sustaining a competitive edge in the changing global scenario: challenges, practices and innovations” organized by Christ University, Bengaluru, in collaboration with Institute of Management Accountant (IMA) during Feb 07th to Feb 08th, 2017.
3. Anil Kumar M. & Rajesh Acharya H. (2016), “Profit Potential of Insider’s And Outsider’s: During And After The Financial Crisis In India” paper presented in “Fourth Pan-IIM World Management Conference” organized by 13 IIM’s, hosted by IIM-Ahmedabad during December 13th and December 15th, 2016.
4. Anil Kumar M. & Rajesh Acharya H. (2016), “Insider Trading and Abnormal Stock Returns: Evidence From India” paper presented in “International Conference on Financial Markets and Corporate Finance” organized by IIT-Madras, during August 12th and August 13th, 2016.
5. Anil Kumar M. & Rajesh Acharya H. (2016), “Information Content of Insider Trading: Empirical Evidence from India” paper presented in “2nd International Conference on Applied Economics and Business” organized by Shri Mata Vaishno Devi University, Jammu & Kashmir, in collaboration with The Indian Econometric Society (TIES) during July 28th to July 29th, 2016.
6. Anil Kumar M. & Rajesh Acharya H. (2015), “Legal Insider Trading Behaviour: An Empirical Study from India” paper presented in “India Finance Conference 2015” organized by IIM-Ahmedabad, IIM-Bangalore & IIM-Calcutta, hosted by IIM-Calcutta during December 17th to December 19th, 2015.
7. Anil Kumar M. & Rajesh Acharya H. (2015), “Legal Insider Trading Behaviour: Empirical Evidence from India” paper presented in “PhD Consortium 2015” organized by Shailesh J. Mehta School of Management, IIT-Bombay during November 30th to December 1st, 2015.
8. Anil Kumar M. & Rajesh Acharya H. (2015), “Insider Trading Regulations in India”, paper presented in the 4th International Conference on Emerging Trends in Finance and Accounting held at SDM Institute for Management Development, Mysore, during 21st-22nd, August, 2015. ISBN: 978-93-83302-09-3.

Workshops/FDP's Attended

No.	Name of the course	Date(s) / Duration	Sponsoring Agency	Host Organization
1	Crafting & Conducting High Quality Research	9 th to 10 th Dec 2017 / 2 days	Indian Institute of Management, Ahmedabad, (IIM-A)	Siddaganga Institute of Technology, Tumkur
2	Research Writing	12 th Dec 2016 / 1 day	Indian Institute of Management- Ahmedabad, (IIM-A)	Indian Institute of Management- Ahmedabad, (IIM-A)
3	Emerging Market Finance Research: Future Directions	8 th to 12 th Aug 2016 / 5 days	Global Initiative of Academic Networks (GIAN) MHRD, Govt. of India	IIT-Madras (IIT-M)
4	Applied Financial Modelling	8 th to 12 th July 2016 / 5 days	Global Initiative of Academic Networks (GIAN) MHRD, Govt. of India	IIT-Hyderabad (IIT-H)
5	Statistical Packages for Research	16 th to 20 th Mar 2015 / 5 days	University Grants Commission (UGC)	UGC-Academic Staff College, Maulana Azad National Urdu University, Hyderabad
6	Panel Data Econometrics & its applications	7 th to 9 th Jan 2015 / 3 days	The Indian Econometric Society (TIES)	Gokhale Institute of Politics & Economics, Pune
7	National Seminar on "Forensic Accounting & Fraud Examination"	1 st to 2 nd Dec 2014 / 2 days	Board of Studies, Institute of Chartered Accountants of India (ICAI)	Osmania University, Hyderabad
8	Financial Research Workshop	7 th to 8 th Nov 2014 / 2 days	Financial Research & Trading Laboratory (Finance Lab)	Indian Institute of Management- Calcutta, (IIM-C)
9	Workshop on Script Writing (Academic writings & Publication Skills)	24 th to 26 th Sep 2014 / 3 days	University Grants Commission (UGC)	UGC-Academic Staff College, Maulana Azad National Urdu University, Hyderabad
10	FDP on Commodity Market & Futures Trading	7 th to 8 th Aug 2014 / 2 days	Forward Markets Commission (FMC), Ministry of Finance	Indian Institute of Plantation Management (IIPM-B), Bengaluru
11	Improving the Quality of Research & making Mid-Course Corrections	25 th to 29 th March 2014 / 5 days	All India Council for Technical Education (AICTE)	Indian Institute of Technology-Madras (IIT-M)

12	Developments in Statistical Methods for Data Analysis of Excluded Groups	20 th & 21 st March 2014 / 2 days	Ministry of Statistics & Program Implementation	University of Mysore, Mysore
13	Multivariate Analysis using SPSS and spreadsheets	30 th Jan to 1 st Feb 2014 / 3 days	Technical Education Quality Improvement Program (TEQIP-II)	National Institute of Technology, Calicut (NIT-C)

Experience

Designation	Name of the Employer	Total Duration of Work
Assistant Professor	XIME, Bangalore	
Full time Research Scholar	National Institute of Technology Karnataka	3.6 Years
Assistant Professor	Kakatiya Institute of Management Studies, Karimnagar	7 Months
Assistant Professor	Sree Chaitanya College of Engineering, Karimnagar	1.4 Years
Relationship Manager	Reliance Mutual Fund, Guntur	10 Months
Stock Broker	Angel Broking, Karimnagar	1 Year
Management Trainee	VEM Technologies Pvt. Ltd, Hyderabad	7 Months

Education

Examination Passed	Name of the Board / University	Year	% of marks	Division
MBA	Jawaharlal Nehru Technological University, Hyderabad, Telangana	2009	70	I (Distinction)
BBM	Kakatiya University, Warangal, Telangana	2007	65	I
Intermediate	Intermediate Public Examination (AP)	2004	74	I (Distinction)
SSC	Board of Secondary Education (AP)	2002	63	I