HERDING AND PANIC BEHAVIOUR IN NATIONAL STOCK EXCHANGE OF INDIA: AN EMPIRICAL STUDY

A Thesis Submitted

To

Sikkim University

In Partial Fulfilment of the Requirement for the

Degree of Doctor of Philosophy

By

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Date: 20-6-2019

DECLARATION

I, Dinesh Gupta, hereby declare that the research work embodied in the Thesis titled "Herding and Panic Behaviour in National Stock Exchange of India: An Empirical Study" submitted to Sikkim University for the award degree of Doctor of Philosophy, is my original work. The Thesis has not been submitted for any other degree of this University or any other University.

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This is to certify that Thesis titled "Herding and Panic Behaviour in National Stock Exchange of India: An Empirical Study" submitted to the Sikkim University for partial fulfillment of the degree of Doctor of Philosophy in the Department of Commerce. embodies the result of bonafide research work carried out by Dinesh Gupta under my guidance and supervision. No part of the Thesis has been submitted for any other Degree, Diploma, Association and fellowship.

All the assistance and help received during the course of investigation have been duly acknowledge by him.

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(Dinesh Gupta)

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LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
ADR	American Depository Receipt
AMEX	American Stock Exchange
ANOVA	Analysis of Variance
AR	Autoregressive Model
ASE	Athens Stock Exchange
BRIC	Brazil, Russia, India, China
BSE	Bahrain Stock Exchange
CAPM	Capital Asset Pricing Model
CEE	Central and East European
CMIE	Center for Monitoring Indian Economy
CSAD	Cross-Sectional Absolute Deviation of Returns
CSADDOWN	Cross-Sectional Absolute Deviation of Stock Return when market is down
CSADUP	Cross-sectional Absolute Deviation of Stock Return when Market is up
CSSD	Cross-Sectional Standard Deviation
CSSDDOWN	Cross-sectional Standard Deviation of Stock Return when Market is down
CSSDUP	Cross-sectional Standard Deviation of Stock Return when Market is up
EMH	Efficient Market Hypothesis
ETFs	Exchange-Traded Fund
EUR	EURO
FII	Foreign Institutional Investment
GBP	Great Britain Pound
GDP	Gross Domestic Product
GSO	Green Shoe Options
IIs	Institutional Investment

KSE	Karachi Stock Exchange
LSV	Lakonishok, Shleifer and Vishny
MF	Mutual Funds
MFI	Mutual Fund Investment
NASDAQ	National Association of Securities Dealers Automated Quotations
NBER	National Bureau of Economic Research
NCR	National Capital Region
NSE	National Stock Exchange
NYSE	New York Stock Exchange
OLS	Ordinary Least Square
OTCE	Over the Counter Exchange
PSX	Pakistan stock exchange
QFIIs	Qualified Foreign Institutional Investment
QR	Quantile Regression
RBI	Reserve Bank of India
REIT	Real Estate Investment Trust
Rmt	Absolute Return of the Market returns
SD	Standard Deviation
SEBI	Security Exchange Board of India
T-Bill	Treasury Bill
TOM	Turn-of-Month
TUNINDEX	Tunisia Stock Exchange
TWSE	Taiwan Stock Exchange Weighted Index
UK	United Kingdome
UN	United Nation
US	United States
USA	United States of America

CHAPTER 1

AN INTRODUCTION TO HERDING AND PANIC BEHAVIOUR IN NATIONAL STOCK EXCHANGE OF INDIA: AN EMPIRICAL STUDY

1.1 Introduction

Indian Stock Market had been predominately brokers driven, the presence of retail investors is not substantial. Hence, the market moods are largely determined by the manipulation of the brokers and large players. Despite the market regulation trying to protect the retail investors, they are the victims of information asymmetry. The abnormal information is visible when there is abrupt change in the market. The resultant situation is that of Panic. Panic leads the market to extreme rallies which pushed the market to herd to extreme values. Due to these extreme activities which we refer to as herding spreads across the market. When the investors are anticipating extreme change in values from clusters it leads to market wide herding.

The current study tries to examine the existence of 'market wide' herding, bull bear phase and panic in Indian stock market.

The National Stock Exchange (NSE) has been taken as the proxima for Indian Stock Market as it is the largest Stock Market in India in terms of its capitalization. The study is conducted for a period of 10 years commencing from 1st April 2006 to 31st March 2016 on NSE comprising of the NIFTY and its 50 stocks data.

The study draws upon the premise that rationality in investment is a basic requirement to conform to financial theories especially that of portfolio creation. Researchers have

emphasized on the fact that an actual investor conform to the "rational" assumptions of the standard finance theories. The argument that investors are not calculative utility maximizing machines as what has being portrayed by traditional theories is put under the scanner. It has been observed that investors are led by their sentiments and are prone to make cognitive errors. These errors, lead to market anomalies to take place, they in turn effect the functioning of stock markets. Thus, the need for comprehending such anomalies and shortcomings of human judgment involved with them became the precursor of behavioural finance and the connotation of the study in this case.

1.2 History of Modern Finance

Researchers, specifically on the stock market have been very active over the past sixty years. One can find various schools of thoughts, disciplines and sub disciplines, which have been explored in the past, present and future, to study the area of finance and investments in depth. There are various path breaking studies in modern finance which basically focused on the behaviour of stock returns in different aspects. If we search the history of the conceptual and empirical researches in modern finance, it can be found that Markowitz's theory (1952) of Asset Pricing, Capital Asset Pricing Model (1960s) where the quantitative model for measuring unsystematic risk .Theories introduced by Treynor (1962); Sharpe (1964); Lintner (1965) and Mossin (1966) brought in understanding of portfolio management. Efficient Market Hypothesis (EMH) by Samuelson and Fama (1960s), the Modigliani-Miller (1988) approach, the Black, Scholes and Merton (1970) approach for option pricing were decisive in investment decision. The introduction of the concept of 'Behavioural in the late seventies Finance' by Khenman (1973) brought in some major breakthroughs. All these tools and theories helps in a better understanding about the market. All these theories enabled the investor

to assess and manage the risk and returns associated with the assets and develop appropriate tools in this regard.

The discussion on investments with context of the price behaviour of the stock starts with the theory of Markowitz (1952), a single-period model for portfolio selection explained with multiple assumptions that the risk of the investment can be measured by the variance (or standard deviation) of the portfolio's return. The Markowitz's portfolio selection model helps the investors to plot the efficient frontier of risky assets and provided a useful framework for selecting an optimal combination of risky funds. However, this model was silent about the risk return relationship for individual assets.

The Capital Asset Pricing Model (CAPM) developed by Treynor (1962); Sharpe (1964); Lintner (1965) and Mossin (1966) is an extension of the of Markowitz portfolio theory and is mainly used for the purpose of security valuation, risk analysis, estimation of cost of capital and evaluation of the performance of portfolios. The simplicity and the ability to provide theoretical support to measure risk and the relation between expected return of the assets in the market is the center of attraction of this model.

The essence of this model is that the expected return on any asset is a positive linear function of its beta, the measure of risk that explains the cross section of expected return of the asset. However, from late 1970s onwards many questioned this theory and its ability in explaining the return of an asset through beta. Influence of many other factors and anomalies in predicting return of an asset and the way it is used to explain the market efficiency, was under scanner.

The studies on Stock Market had gathered momentum since the early part of nineteen fifties. Studies by Fama (1965) ad vented a new concept of studying the pattern of price discovery and paved the path for Efficient Market Hypothesis (EMH). Thereafter, EMH

and market anomalies had dominated the space of financial research for more than three decades.

The Indian Stock Market with a history of two hundred years is an interesting platform to study the various factors, exogenous and endogenous, on the price formation. Several studies have been conducted to prove that the Indian Stock Market is efficient. The EMH were largely addressing macro structure issues. It was important that micro structure such as effect of interest rates, mobility in tick price and volatility be studied to understand the problem in detail. However, the study also could not assume the behaviours bias of the investor. The current shift therefore is towards understanding these behaviour biases. Since very little has been understood in the context of the behaviour, this thesis would like to examine the behaviour of the Indian Market especially the 'Herding behaviour' in the Market.

1.3. Stock Market Behaviour and the development in the field of Behavioural Finance

Prevalent knowledge and understands of the stock market shows that there are numerous variables that affect prices in the securities markets. Investors' decisions to buy or sell may have a more distinct impact on market value than favorable earnings at stock or promising products.

It is interesting to note that the first attempt to understand the behaviour was by Fama (1970) through the concept of Efficient Market Hypothesis (EMH) where he showed that prices are influenced by information available in the market. The Random walk and the subsequent market form that were developed namely 'weak', 'strong and 'semi-strong' which collaborated information dissemination and its effect on the price of the stock.

During the early 1990s, it was understood that EMH, is not being able to explain the price changes as desired. Researchers were divided over the concepts of the market forms and the information asymmetry, and its use in the price formation in the market.

1.4. Efficient Market Hypothesis (EMH): The Early Discussions

The Efficient Market Hypothesis (EMH) has been a central finance paradigm for over 40 years, probably the most criticized too. Fama (1970) defined an efficient market as one in which security prices fully reflect all available information, and hypothesis states that real world financial markets are efficient. It goes on to say that it would be impossible for a trading system based on currently available information to have excess returns consistently. The University of Chicago, home to the EMH, became the world's center of academic finance. Fama (1965) distinguished between three forms of the EMH i.e. (i) the "Weak" form efficiency where all past market prices, returns and other information are fully incorporated in prices, which makes it impossible to earn credible risk-adjusted profits based on historical data and renders technical analysis useless; (ii) the "Semi-strong" form states that it is impossible for investors to earn superior returns using publicly available information since they would already be incorporated in the prices and rendered fundamental analysis useless and (iii) the "Strong" form of EMH states that all information, public and private, are fully reflected in securities prices. This would mean that even insider information would not help an investor to land in superior returns, (Chen et al., 1999). Much of the evaluations have been based on the weak and semi-strong form efficiency since it was difficult to accept the strong form, and there was also evidence that insiders did in fact earn abnormal returns even while trading legally. Fama (1965) found in support of weak form efficiency that stock prices followed a random walk pattern. The semi-strong efficiency was tested by event studies

– studies where effect of various news 'events' on share prices were studied – pioneered by Fama et al. (1969) observed that investors may be inclined toward various types of behavioural biases, which lead them to make cognitive errors. Investors may make predictable, non-optimal choices when faced with difficult and uncertain decisions because of heuristic simplification.

1.5. Efficient Market Hypothesis (EMH): Some Recent Developments

There are few studies which are noteworthy on EMH on recent times which require special mention as given below:

Haugen (1999) argues that rational efficient market is not consistent with empirical findings on abnormal stock returns for stocks with high current earnings yields, high book-to-price ratios, short-term price momentum and long-term reversal and excessive price volatility. In reality, when risk and uncertainty or incomplete information about an alternative or high degree of complexity of price information is introduced, people or organizations may behave somewhat different from rationality.

Nagarajan (2008), in his article, "Green Shoe option in IPO", studied stabilizing the process post-listing of share price, and find that a company making an Initial Public Offer (IPO) through the Book Building mechanism can hold the Green Shoe (GSO) for the same process of stabilization. GSO is an option that allows underwriter of an (IPO) to sell additional shares to the public through an institutional arrangement in case of price destabilization. The challenge for the regulator would be to keep fraudulent issues away from the market. He opined that in order to avoid fraudulent issues investors too should do their homework before investing in IPO because it is investor's hard earned money and they should exercise due diligence.

Compton, Johnson and Kunkel, (2006) studied The Turn-of-the-Month (TOM) effect in Real Estate Investment Trusts (REITs). The study seeks to examine the market returns of five domestic real estate investment trust (REIT) indices to determine whether they exhibit a TOM effect. They carried out test for the TOM effect by employing a battery of parametric and non-parametric statistical tests that address the concerns of distributional assumption violations. An Ordinary Least Square (OLS) regression model compares the TOM returns with the Rest-of-the Month (ROM) returns and an ANOVA model examines the TOM period while controlling for monthly seasonality. A non-parametric t-test examines whether the TOM returns are greater than the ROM returns and a Wilcox on signed rank test examines the matched-pairs of TOM and ROM returns. They found that a TOM effect in all five domestic REIT indices was found: Real Estate 50 REIT, all-REIT, equity REIT, hybrid REIT, and mortgage REIT. More specifically, the six-day TOM period, on average, accounts for over 100 per cent of the monthly return for the three non-mortgage REITs, while the ROM period generates a negative return. Additionally, the TOM returns are greater than the ROM returns in 75 per cent of the months.

Watanapalachaikul and Islam, (2006) had studied on The Anomaly of The Thai Stock Market with an objective to examines daily seasonal anomalies (day of the week effect) and the monthly seasonal anomalies (January effect) for the case of the Thai stock market. Thorough analysis had been made using returns derived from the Stock exchange of Thailand, SET index, adjusted for geometric returns by using a logarithm neporiano to identify the behaviour of investors in this market. Data gathered from the SET include both monthly and daily returns prices from January 1992 to December 2001. The paper suggests the existence of the Day of the Week Effect and January effect. The returns differential between Monday and the best performing day is

significantly large and the January effect was also present in most of the time periods except during the pre-crisis periods examined, when an unusual negative return in January was identified, along with an unusual positive return in seven other months, December being the month with the highest return, followed closely by October.

Asiri (2008) studied the weak-form efficiency in the Bahrain stock market with the aim to measure the weak-form efficiency. To measure the behaviour of stock prices in the Bahrain Stock Exchange (BSE), which is expected to follow a random walk. Random walk models such as unit root and Dickey - Fuller tests were used as basic stochastic tests for a non-stationary of the daily prices for all the listed companies in the BSE.

In addition, autoregressive integrated moving average (ARIMA) and exponential smoothing methods are also used. Cross-sectional-time-series is used for the 40 listed companies over the period 1st June 1990 up until 31st December 2000. The findings shows 'Random Walk' with no drift and trend is confirmed for all daily stock prices and each individual sector. Other tests, such as ARIMA (AR1), autocorrelation tests and exponential smoothing tests also supported the efficiency of the BSE in the weak-form.

Viswambharan (2006), in his article entitled, "Indian Primary Market – Opportunities and Challenges", has examined the recent trends in primary market, the current IPO system – book building process, opportunities for investors, problems faced by the investors and has suggested that investors should rely on long term investment than speculation.

1.6. Criticism of Efficient Market Hypothesis

The concept of efficient market hypothesis has been the subject of rigorous academic research since its inception. The dominance of the concept was widely accepted by

academic and financial community. However, over the last two decades, the theoretical and empirical basis of the efficient market hypothesis have been questioned by many researchers and the behavioural economists and proponents of behavioural finance, who argue that the process of price adjustment is not quick enough as EMH suggests the significant and systematic deviations of prices from the fundamental value are expected to continue for long time intervals, in contrast to what EMH suggests.

There are a large number of striking events in favor of behaviourists to explain and support the inconsistencies of the real market with the Efficient Market Hypothesis, including the various anomalies and market microstructure, different crashes in the capital market, bubbles and numerous emotional bias led incidents that have affected financial markets. The crises of 1987, the dot com bubble (2003), the crash of (2007 - 2008) are few examples of such crash and bubbles, which continued for long period.

The proponents of behavioural finance argue that the cognitive or emotional biases, both individual and collective, produce anomalies in market prices and leads to deviation from the concept of efficient market hypothesis. There are many rational as well as irrational factors which drive the behaviour of the investors and the investors frequently make irrational decisions. For these reasons the market price does not always gives a fair estimate of actual value of the underlying security. *"However the proponents of efficient market hypothesis have the opinion that any observed anomalies will eventually be priced out of the market or explained by appeal to market microstructure. These issues further indicate the necessity to distinguish between individual biases and social biases; the former can be averaged out by the market, while the other creates feedback loops that drive the market further away from the equilibrium of the fair price"* Akintoye (2008).

In another context, Shefrin (2002) explains that investor psychology can drive market prices and fundamental values very far apart. Malkiel (2003) noted that, *"As long as*

stock markets exist; the collective judgment of investors will sometimes make mistakes. Undoubtedly, some market participants are demonstrably less than rational, may lead to irregularities in pricing. This may lead even predictable patterns in stock returns and can appear over time or even persist for short periods. Moreover, the market cannot be perfectly efficient, or there would be no incentive for professionals to uncover the information that gets so quickly reflected in market prices". These arguments stress the importance of behavioural traits in financial activities and the need to consider the arguments of behavioural finance.

1.7. Traditional Finance V/s Behavioural Finance

There are differences in the thoughts and perceptions with regards to traditional finance and behavioural finance and there are a number of arguments in considering behavioural economics as a different school of thought. The Neo Classical Theory argues that the individual behaviour is rational but the practice of behavioural finance and the supporting scientific methods are different. Barber and Odean (1999) explained that *"financial economics assumes individuals behave with extreme rationality and these deviations from rationality are often systematic, but Behavioural finance relaxes the traditional assumptions of financial economics by incorporating these observable, systematic and very human departures from rationality into standard models of financial markets".*

The distinction between behavioural and main stream economists is that they hold different normative conceptions of economics as science.

The main distinction between traditional finance and behavioural finance lies in the fact that the former discusses how investors manage their portfolio, whereas the latter explains how the investor actually behaves in the market and the corresponding effect

on the pricing of an assets and argues that the pricing of asset is not entirely based on the risk and return of the asset only but is also affected by sentiments and many other psychological "biases" and "heuristics". Behavioural finance closely combines individual behaviour and market phenomena and uses knowledge taken from the field of both psychology and financial theory, Fromlet (2001) observe that traditional finance considers and assume that investors have complete information about the economic conditions and the market events and they use this information to make informed decisions. The theories of traditional finance are based on the rationality of the investors, argue that people use, available information appropriately and correctly and make judgment subject to their analyses on the other hand behavioural finance recognizes that people often use estimations made according to a rough and ready practical rule for decision making.

Traditional finance explains that the price of an asset in the market is an unbiased estimate of its intrinsic value but the findings of behavioural research shows disagreement between market price and fundamental values of assets. Further, Rabin (1998) explained, *"Economics has conventionally assumed that each individual has stable and coherent preferences and that rationally maximizes those preferences but psychological research suggests various modifications to this conception of human choice"*. Traditional finance is mostly justified by tested methods, logical analysis and empirical field testing but behavioural finance often fails since human behaviour is complex and attending to all facets of human behaviour is neither feasible nor possible.

1.8. Beginning of Behavioural Finance

"All people (even smart ones) are affected by psychological biases" states Nofsinger J.R (1999) in his book, Investment Madness: How Psychology Affects your Investing.

The study of human behaviour is one of the most fascinating endeavors throughout human history and there have been many attempts by psychologists and behaviourists to formalize the understanding of human behaviour. The American Heritage Dictionary defines psychology as *"the science that deals with mental processes and behaviour"*. In contemporary times, psychological principles are widely applied in a variety of perspectives and in a wide range of settings in human learning and social interaction. Understanding psychological factors is inevitable because realizing behaviour enhances the ability of one for better understanding the people, the situation and the decision making process and hence enhances the quality of the resultant actions.

Agreeably, the price was being influenced by things which were beyond the explanation given by the conventional forms of research. The search for newer forms gave birth to a new area called Experimental Economics by Khenman and Trivosky (1970).

Thereafter, various interdisciplinary work lead to ideas generated in the area of a new form of research called Behavioural Finance. Studies by (Rozeff and Kinney (1976) and Thaler (1988) enshrined that human behaviour had a large effect on the price discovery in the stock market. Several studies were conducted on European and USA stock market conforming the results.

1.9. Growth of Behavioural Finance

During the 1990s, a new field known as behavioural finance began to emerge in many academic journals, business publications, and even local newspapers. The foundations of behavioural finance, however, can be traced back over 150 years. Several original books written in the 1800s and early 1900s marked the beginning of the behavioural finance school. MacKay (1841) extraordinary popular 'Delusions and the Madness of Crowds'presents a chronological timeline of the various panics and schemes throughout

history. This work shows how group behaviour applies to the financial markets of today. Le Bon's important work, 'The Crowd: a Study of the Popular Mind', discusses the role of "crowds" (also known as crowd psychology) and group behaviour as they apply to the fields of behavioural finance, social psychology, sociology, and history. Selden's (1912) book on Psychology of the Stock Market was one of the first to apply the field of psychology directly to the stock market. This classic, discussed the emotional and psychological forces at work on investors and traders in the financial markets. These three works along with several others form the foundation of applying psychology and sociology to the field of finance. Today, there is an abundant supply of literature including the phrases "psychology of investing" and "psychology of finance". It is evident that the search continues to find the proper balance of traditional finance, behavioural finance, behavioural economics, psychology, and sociology.

The uniqueness of behavioural finance is its integration and foundation of many different schools of thought and fields. Scholars, theorists, and practitioners of behavioural finance have backgrounds from a wide range of disciplines. The foundation of behavioural finance is an area based on an interdisciplinary approach of research.

Chen et al. (2007) studied the behavioural biases, abstractly, and defined in the same way as systematic errors are, in judgment. Researchers distinguish a long list of specific biases, applying over fifty of these to individual investor behaviour in recent studies. When one considers the derivative and the undiscovered biases awaiting application in personal finance, the list of systematic investor errors seems very long indeed. Research that is more brilliant seeks to categorize the biases according to some kind of meaningful framework. Some authors refer to biases as heuristics (rules of thumb), while others call them beliefs, judgments, or preferences; still other scholars classify

biases along cognitive or emotional lines. This sort of bias taxonomy is helpful in underlying theory about why people operate under bias.

Pompian (2006), observed that instead of a universal theory of investment behaviour, behavioural finance research relies on a broad collection of evidence pointing to the ineffectiveness of human decision making in various economic decision-making circumstances.

Barber and Odean (2001) partitioned investors based on gender and based on the previous psychological research fact that men are more overconfident than women, tested the theory that overconfident investors trade excessively. Fagerström (2008) conducted a study to investigate overconfidence and over optimism in the market and factors that affect human beings in decision making when it comes to investing and analyzing and find that analysts of the S&P 500 were exaggerated by the problems of over confidence and the over optimistic biases. It also confirms theory of Anchoring and Herding.

Shefrin (2000) and Ritter (1991) noted another interesting consequence of judgment by representativeness bias where he attributes long run underperformance of IPOs to the investors' short term orientation. This has many implications to investment decision making. While making investments, individuals tend to attribute good characteristics of a company directly to good characteristic of its stock. These companies turn out to be poor investments more often than not (Lakonishok et al. (1994). Investors apply to "herd behaviour" because they are concerned of what others think of their investment decisions Scharfstein and Stein (1990).

Shiller (2003) in his paper from Efficient Market theory to behavioural finance was of view that in the 1990s, academic discussion were shifted from econometric analyses of

time series on security prices, dividends and earnings toward building models of human psychology as it connects to financial markets. This leads to development of field of behavioural finance for which he acknowledge the empirical work of Lo and MacKinlay's 1990 book "The econometrics of financial markets".

1.10. Importance of Behavioural Finance in the Capital Market

There is large number of examples for the sentiment driven stock market movement throughout the world markets. Although the concept of behavioural finance has been introduced and discussed only over the last three to four decades back, researches in behavioural finance got its pace and momentum only at the beginning of this century. For the last two decades, the field of behavioural finance has showed many examples for the significant failure of equilibrium rational choice models in explaining the real economic behaviour [Schleifer (2000); Hirschleifer (2003); Barberis and Thaler (2003)]. They discussed many issues from the stock market and argued that high volatility and market crashes often occurs not only because of the fundamental issues, but the investor's emotions and sentiments also play an important role in such events. Further Miller (1977) also noted that unless arbitrage opportunities are complete, larger divergence of opinion will lead not only to greater price volatility but also lead to higher equilibrium market prices.

While discussing the importance of behavioural finance in the capital market it is worth mentioning that "the importance of behavioural finance has drastically increased after the occurrence of various financial crisis and both wealth management institutions and other investors leveraging key tenets of behavioural finance to rebuild investor trust and confidence and drive further innovation into their offerings and service models" (World

Health Report, 2010). Even if the practices and principles of behavioural finance have not been widely incorporated into wealth management, today investment companies and also the analysts seek the principles and researches of behavioural finance to solve many issues and challenges of the highly tough current investment arena. Further limited information and investor's bias towards information, challenge many of the principles and predictions of the Efficient Market Hypothesis, which is considered as one of important theories in finance where it many a time contradicted reality and experience. Further, behaviour finance provides answers to a number of questions about the irrationality of the investor's behaviour. In addition to this understanding, investor psychology will add value to build unique trading strategies and to take the advantage of profit opportunities which occurs due to the mispricing in the market.

Behavioural finance offers salvation to neo-classical finance through explaining many issues that challenged the theories of finance and suggests a combination of both neoclassical finance and behavioural finance to solve the real issues in the market. Mullainathan and Thaler (2000) informed that financial markets have greater arbitrage opportunities than other markets and behavioural factors might be thought to be less important here, but they showed that even the limits of arbitrage create anomalies that the psychology of decision making helps explain. Since saving for retirement requires both complex calculations and willpower, behavioural factors are essential elements of any complete descriptive theory". All this explain the relevance and importance of behavioural finance and shows the inevitable role of behavioural finance in the field of investment. Further numerous studies in decision science, cognitive and evolutionary psychology indicate that modern finance is behaviourally flawed.

1.11. Advantage of Behavioural Finance

There is no doubt that behavioural finance has found its place in the arena of financial research. This explains why investors make systematic errors and the effect of such sentiments and emotions on prices and return, which ultimately leads to market failures and explains how other participants buys and sells in such market inefficiencies for making profit. In addition to this, it strives to recognize the role of human behaviour and applies insights from all of the social sciences to finance and sheds light on irrational deviations from traditional decision-making models to explain economic and financial phenomena.

Understanding the investor's behaviour helps the firms and advisors to tackle various issues in more dynamic and less certain environment. Understanding of the emotions, biases, penchant and affinity of investors in making choices and decisions and one can effectively use this for analyzing the market conditions,counseling the investors, wealth management,better decision making, planning and also to set goals. Behavioural finance explains many anomalies in the market and this can be used for more effective asset allocation framework where traditional theories often fail to explain the anomalies of the market.

In addition, behavioural finance explains the asymmetric effect of risk and return by using the psychological overlay and understanding different behavioural issues in the market will help investors, analysts and wealth managers to avoid emotion -driven speculation and helps them to follow suitable investment techniques and ideas. The behavioural explanation can be used effectively for the modeling of securities prices and it explains many anomalies that cannot be explained by traditional finance theories. Analysts also use behavioural finance as the theoretical basis for technical analysis.

Voluminous studies on behavioural finance have contributed both theoretically and empirically and had proven that investor psychology plays an important role in investor's investing behaviour and thereby it can influence the market movements. Behavioural finance focuses on the investor's irrationality in their reactions to information and the decision making process to analyze and understand anomalous pricing behaviour of assets and the market. The irrationality of the investor arises from psychological biases and heuristics and leads to mispricing of assets. Hence the asset price may deviate from predictions of traditional market models which ultimately lead to market inefficiencies. [(Thaler (2005); Shleifer (2000); Shefrin (2000, 2009))]. The researchers pointed out a number of behavioural traits, baises and other anomalies, which contradicts the existing traditional financial theories some of which have been listed in next section.

Table 1.1 Gives glimpses of studies of behavioural biases studied in the area of behavioural finance.

Table 1.1 General Categorization of Various Behavioural Biases.

Sl. NO	**Area of Finance**	**Description**
1	Anchoring	Anchoring as a concept is based on the tendency to attach or "anchor" our thoughts to a cutoff point-even though it may have no logical reference to decision at hand. Although it may seems like an unknown phenomenon anchoring is fairly prevalent in situation where people are dealing with concepts that are new and novel.
2	Behavioural economics	Behavioural economics and its related fields study the effects of its social, cognitive and emotional factors on the economic

		decision of individual and institution and the consequences for market prices, return and resource allocation.
3	Cascade (information)	An information cascade occurs when people observes the actions of others and abandoned their own information in favors of inferences based on earlier people's actions.
4	Cognitive dissonance	Cognitive dissonance is the term used in modern psychology felt by a person seeking to hold two or more conflicting ideas, believes, and values emotional reaction simultaneously. The theory of cognitive dissonance in behavioural finance proposes that people have a motivational drive to reduce dissonance by altering existing cognition such as gilt anger or embracement.
5	Contrarian investing	In finance, a contrarian is one who attains in profit by investing in a matter that differs from a conventional wisdom when an opinion appears to be wrong.
6	Control illusion	Control illusion is the tendency of people to overestimate their ability to control events and the outcomes of such event. The illusion of control creates superiority bias and is taken as one of the positive illusion.
7	Bubbles & crashes	Persistent economic phenomena which occurs because of information asymmetry. These bubbles are there until a certain rally occurs and it bust open to a crash. Crashes are opposite of bubbles.
8	Fads	A fade is any form of behaviour that develops among a large population and is collectively followed with enthusiasm for some period and is generally believed to be a novel idea or wave.
9	Familiarity bias	The familiarity bias or heuristic also known as hind side bais implicates individual experience in real life when the situation occurs familiar to previous situations and individual experience a high cognitive load.

10	Fear	Fear is an emotion induced by a perceived theft that causes animals to move quickly away from the location from the perceived threat and sometime hide. It is a survival mechanism in response to specific stimuli. Fear is one of the major interest areas for financial studies as this induces panic in market.
11	Gender bias	Studies in finance shows superiority of male investment decisions on female investment decisions. A milder way of looking at it shows man and women process information in the market in different ways and perceive different results.
12	Greed	Greed is the inordinate desire to posses' wealth, good or object of abstract value with the intention to keep it for one owns self far beyond the basic survival and comfort need.
13	Herd behavior	Herd behaviour, which is tendency for individual to mimic the actions whether rational or irrational of a larger group. There are a couple of reasons which leads to herd behaviour. The first is social pressure of conformity. The second being the fear of being left behind by the group.
14	Issues of trust	Issues of trust refers to the level of trust an investor has while making Financial or investment decisions that can be caused by exogenous groups such as investment advisor etc.
15	Loss aversion	In economic decisions theory loss aversion refers to people tendency to strongly prefer avoiding losses to acquire gains. Some studies show that loss aversion is twice as powerful as psychological gains.
16	Menias	Menia is a state of abnormally elevated or irritable mood, arousals and/or energy level. In a sense it is opposite of depression in investment menias leads to wrong decisions and often compulsive investment supported by obsessive compulsive disorder.

17	Market efficiency (inefficiency)	The efficient market theory is a belief that markets are efficient because the stock prices had been adjusted for all known information and the prices change instantly as the information is updated. The truth is that most experienced investors know it is just the opposite. Markets are highly irrational and the predominant emotions or greed and fear which drives prices high or low depending on good and bad news.
18	Over reaction	Over reaction refers to judgmental bias an individual develops on the information available to him or her. Overreactions are generally pacimastic reactions.
19	Panic	Panic is a sudden sensation of fear which is so strong as to dominate or prevent reasons and logical thinking, replacing it with overwhelming, felling of anxiety and frantic agitation consistent with an animalistic fight-or-flight reaction. Panic may occurs singularly and can be generate in a group. Herding often happens following a panic situation.
20	Regret theory	Regret (also called opportunity loss) is defined as the difference between the actual payoff and the payoff that could have been obtained if a differential course of action has been chosen. This is also called difference regret.

Source: Compiled from various sources including internet, books and other sources.

1.12. Herding Behaviour

"In the past few decades, the behavioural finance theory has emerged to compete the classical theory of finance. While the classical finance focuses on the logical justifications in the process of investment decisions, the behavioural finance takes into account the psychological and behavioural aspects of this process. Behavioural finance

deals with individuals and their ways of collecting and using information." [Ali Shusha and Abdelaziz Touny (2016)].

"As one would expect with span several disciplines, there is no clear that inquiries about herding in the literature; consensus on the definition of however, certain common themes emerge. First, herding is usually defined in terms of crowd behaviour –that is, a group is defined as a herd if members of that group tend to move more strongly with each other than with the collective movement of other groups. Second, herding can be based on fundamentals or herding can be faddish. In the former case, imperfectly rational agents deduce information from the behaviour of other agents in the herd perhaps because of the additional cost of obtaining or verifying information from outside the herd. Herding can be based on fads if agents behave irrationally and limits to arbitrage prevent prices from rapidly converging to fundamental values. Even rational informed agents may decide to ride the fad when fundamental information and/or arbitrage are costly [Amirat and Bouri (2009a)]. Herding occurs when a group of individuals behave irrationally by trying to mimic the action/ decisions of others. Human beings are highly interactive with other members of the society and there exists a normal interdependence and symbiosis among the members and their behaviour is often natural and individually rational. Herding is one of the common behavioural biases which almost all type of creatures in the world including human beings are prone to it. The herd instinct is innate in the human mind and there is a rather widespread tendency among people to behave mechanically or unconsciously imitate what most others do. "Herding theory has its roots in Keynes (1930), who focused on the motivations to imitate and follow the crowd in a world of uncertainty" [(Cited Baddeley M (2010))]. Herd behaviour denotes the tendency to imitate or follow

other individual or groups and this behaviour has been observed not only in financial markets but also in other areas of human life. Herding indicates an inefficient market and this behaviour is explained as a correlated behaviour, which arises when investors suppress their own private information, and imitates or follows others‟ actions or decisions. This is an accidental spontaneous reaction (unplanned) from the part of an investor to follow others to the negative or positive movement of the market or to the negative or positive price movement of an asset or an industry.

In the stock market herding behaviour is one of the prominent and most Sevier emotional illnesses expected from the investor that might lead to unfavorable outcomes in the market. The mentality to herd may be driven by various factors such as cascades, fear, fads, conformity or peer pressure, reputation and it may also arise due to mimicking or imitating or following the path of whole group or crowd. The herding may arise out from a formal or informal groups decisions or may arise due to common convention, or rituals, false consensus, bandwagon effect, i.e. tendency of following or admitting the majority or due to collective obsessional behaviour.

Usually it is not easy for an investor to keep away from herding or following the crowd and the herding behaviour can create a massive trade(selling or buying) in the market. This behaviour spreads and causes wide fluctuation in price either to drop or hike, which eventually leads to the mispricing of assets. There are different stages of Herding, in the first stage the investor may look into his surroundings and try to learn what other participants do in the market and he changes according to market and follows others and finally turns in to the bunching up of buying or selling or turns in to mass uniform behaviour. Christie and Hwang, (1995) explained herding as the behaviour of an “Individual who suppress their own knowledge and beliefs and take

their investment decisions solely on the collective actions of the market, even when they disagree with its prediction" and as a result, the difference of opinion of investors is relatively small.

"The herding behaviour describes a group of individuals who act to imitate the decisions of others or market without paying any attention to their own belief or information," [(Saumitra (2012)].

"Herding, or the deliberate mimicking of the decisions of other agents after such decisions have been observed, is a widespread social phenomenon. Throughout the animal kingdom, herding is a natural instinct as it provides safety from predators. There is an increasing acceptance of the existence of herding among economic and financial agents."[(Radalj and Mcaleer (2003)]. Herding is a form of convergent social behaviour that can be broadly defined as the alignment of the thoughts or behaviours of individuals in a group (herd) through local interaction and without centralized coordination. (Raafat, Chater, and Frith (2009)].

1.13. Meaning and Definition of Herding Behaviour

The definitions that emerge out of the discussions are:

"The average tendency of a group of managers to buy or sell a particular stock at the same time,relative to what could be expected if money managers traded independently" Lakonishok et al. (1992). *"Behaviour patterns that are correlated across individuals"* Devenow and Welch (1996*)."A group of investors trading in the same direction over a period of time",* Nofsinger and Sias (1999). "*The behaviour, although individually rational, produces group behaviour that is, in a well-defined sense, irrational. This herd like behaviour is said to arise from an information*

cascade", Shiller (2000). *"An obvious intend by investors to copy the behaviour of other investors"*, Bikhchandani and Sharma (2000). *"The tendency to accumulate on the same side of the market"*, Hirshleifer and Teoh (2003). *"Herding is often used to describe as the correlation in trades resulting from interactions between investors*", Chiang et al. (2010). *"The decisions of a player are positively influenced by the decisions of the other players, this is referred to as herding behaviour"*, Hott (2009).

1.14. Types of Herding Behaviour

In the financial market, herding defined as the psychologically or emotionally driven tendency of the investors to follow the actions or to imitate the crowd. It is the behaviour shown by the investor to join mechanically the market consensus as other participants do. By analyzing the definitions given by different authors, it is advent that herding occurs in the market when the investors decide to imitate the actions or decisions of other investors; they heavily buy or sell same stocks in the same direction over a period and follow each other's investment decisions strategies.

Herding behaviour explains the situations where large number of market participants performs similar actions. The basic instinct of herd behaviour starts from the price movements of assets or the trend of the market or by observing the actions of other investors. While herding, usually the investor judges the risk in relative terms regardless of the fundamentals. Herding behaviour arises when there is an obvious intent by market participants to copy the behaviour of other investors and it denotes the situations where large number of participants makes common decisions.

Herding arises when the investors imitate the observed actions of others or movements in the market and it may come in different flavors. Literature regarding the subject explains several kinds of herding behaviour. Imperfect information, reputational

reasons, and compensation structures can be the reasons for herding, Bikhchandani and Sharma (2001). In general, researchers divide herding into intentional herding (sentiment driven/rational) and unintentional (spurious/irrational) herding. Further, Bikhchandani and Sharma (2001) noted that, "Intentional herding may be inefficient and is usually characterized by fragility and idiosyncrasy. Several studies pointed out that in a market with noise, the herd behaviour need not always necessarily be irrational. The rational view focuses on "investor psychology and holds that agents centers on externalities, optimal decision -making being distorted by information difficulties or incentive issues, while the irrational view of herd behaviour stresses on investor psychology and holds that agents behave like lemmings, following one another blindly and foregoing rational analysis", Devenow and Welch (1996).

1.15. Methods of the study

Christie and Hawang (1995) examined the investment behaviour of market participants in the equity markets of U.S. "They argued that, when herding occurs, individual investors usually suppress their own information and valuations, resulting in a more uniform change in security returns. Therefore, they employed a cross-sectional standard deviation of returns (CSSD) as a measure of the average proximity of individual asset returns to the realized market average."(Chen, Rui and Xu, 2003).

$$\boldsymbol{CSSD_{it}}=\sqrt{\frac{\sum_{i,t}^{N}=1(R_{i,t}-R_{m,t})^2}{N-1}} \quad \text{..... (i)}$$

Where, $R_{i,t}$ is the return of stock i at time t and $R_{m,t}$ is the cross sectional average return of N stocks of the sample at time t. CSSD has been used as a measure of individual return dispersion. The resultant of Construct Regression model given by Haung (1995) is

$CSSDt = \alpha i + \beta LDitL + \beta UDitU + \varepsilon ti$ ……. (ii)

Herding will be proved if dummy variable coefficients will havenegative and statistically significant with CSSD. Chang et al. (2000) who had extended the work of Christie and Haung and established a nonlinear relationship between equity return dispersion and overall market returns by using Cross Sectional Absolute Deviation (CSAD) as a measure of dispersion. They gave the construct as given here.

$$CSAD_{i,t} = \frac{\sum_{t=1}^{N} |R_{i,t} - R_{m,t}|}{N} \quad \text{……. (iii)}$$

$$CSADt = \alpha + \gamma 1 Rm,t + \gamma 2 Rm,t2 \quad \text{…….} \quad (iv)$$

Where CSAD (cross sectional absolute deviation) is the measure of individual return dispersion and Rmt is daily the market return at time t. Here, the presence of a negative and significant γ2 indicates herd behaviour.

Considering that the stock behaviour may be asymmetric in up and down market phases, the generalized relationship mentioned above can be bifurcated into following;

$CSAD_t^{UP} = \alpha + \gamma 1^{UP} |R_{m,t}^{UP}| \gamma 2^{UP} (R_{m,t}^{UP}) 2 + \varepsilon t$ …….. (v)

$CSAD_t^{DOWN} = \alpha + \gamma 1^{DOWN} |R_{m,t}^{DOWN}| \gamma 2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon t$ …… (vi)

Where |RmtUP| & |RmtDOWN| are the absolute values of the average overall sample return when market is up (or down). Similar to the previous case, here also negative and significant γ2UP and γ2DOWN captures herding behaviour.

1.15.1. Scope of the study

The study is confined to the National Stock Exchange of India and covers a period of 10 years spanning from 1st April 2006 to 31st March 2016. The study is identical towards providing framework of Herding during the period.

1.15.2. Research Questions

The main problems to be identified are been stated below:

(a) Does herding occur as an exogenous issue subsequent to the information asymmetry leading to a large number of out layers in stock price?

(b) Does the outlayer of index return effect the Cross-Sectional Standard deviation (CSSD) of selected stocks in the market?

(c) Does the outer layers of index returns effect the Cross-Sectional Absolute Deviation (CSAD) of the selected stock in the market?

1.15.3. Objectives of the Study

The study will have the following objectives:

(a) To analyze the behaviour of the Indian Stock Market with special reference to NSE.

(b) To analyze the herding behaviour effect on the Indian Stock Market especially in reference to NSE for the period of the study.

(c) To analyze the herding behaviour during stress period such as bull, bear phase and Stock Market crash situations.

1.15.4. Hypotheses for the Study

The research hypotheses are mentioned below:-

Market Wide Herding

i. Ho = There is no presence of herding and panic during the market wide stress phases in NSE.

Bull and Bear Period Herding

ii. H0 = There is no presence of herding and panic during the bull & bear phases of NSE.

1.15.5. Study Hypotheses

The following hypotheses were taken to conduct the study:

iii. Ho = Herding in the market is not there as the dummy variables coefficient are positive

Hα = Herding is there in the market as the dummy variable coefficient are negative

iv. Ho =Herding in the market is not there if $У_1$ and $У_2$ are positive during the up and down periods of the market.

Hα =Herding in the market is there if $У_1$ and $У_2$ are negative during the up and down periods of the market.

1.15.6. Period of the Study

The study is conducted for a period of 10 years commencing from 1st April 2006 to 31st March 2016 on NSE comprising of the NIFTY and 50 stock data which are included in the Index. Stock which are constantly included over all ten years on study or at least figures for more than five consecutive years will be included.

1.15.7. Data Structure, Sample Size and Data Source

The study is being conducted on NIFTY and 42 stocks (out of 50 which are constantly included over all ten years on study or at least figures for more than five consecutive years) with their closing price on a daily basis. A sum of more than 12,903 data points spread for ten years have been used in the study. The data have been collected from the NSE data base for the period of study.

1.16. Limitations

The study contains the limitations inherent to secondary data and the techniques used for understanding the behaviour.

1.17. Conclusion

During the last two decades, the interest in capital markets has increased enormously throughout the world especially in developing countries. The progress and potential of the market have attracted many investors and researchers to discuss a number of issues and complexities in the market. Transition in the financial market over the last two decades has been very fast and is still keeping its pace in terms of growth, expansion and absorbing technology and innovations. During this decade, it has been observed that market has been gradually transforming the investor's landscape and the institutional investors decide mostly the movements of the market. In the beginning of the 1980s, behavioural finance challenged the predictions of efficient market theorem and a large number of explanations have been offered by the theoretical and empirical studies for the different empirical discrepancies. Behavioural finance developed theories based on the social, psychological or cognitive and emotional biases to explain a number of stock market anomalies. Concepts argue that the information structure and the characteristics of investors systematically influence their investment decisions and thereby the market movements and asset prices, often destabilize the market and lead to market inefficiency. Behavioural finance attempts to fill these gaps by exploring the relationship among cognitive or psychological factors which lead to market inefficiency and asset mispricing.

Daniel Kahneman, Amos Tversky and other behaviourists have criticized the rationality- based finance theories with the cognitive-based decision making experiments and have showed how individuals‟ cognitive or psychological issues systematically affect the market and misprice the value of an asset. They raised the issues of biases under uncertainty, the prospects theory and the framing effect etc. and questioned traditional financial theories and the fitness of the theories at least during certain particular conditions of the market. Further a large number of researchers like Shiller, Thaller , Lakonishok, Banerjee, Bikhchandani and Barbera etc. and their studies explored different kinds of human behaviour and showed how they destabilize the market and contribute to mispricing of assets.

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CHAPTER 2

CONTEXTUAL REVIEW OF LITERATURE ON BEHAVIOURAL FINANCE WITH SPECIAL REFERENCE TO HERDING

2.1. Introduction

Behaviour of individual is guided by cognitive processes. Since, individuals form a large part of the stock market, their learning does affect the mobility of price and volatility in the Market. The asymmetry of price in the market are guided by many factors of which, information dissemination is one. The informed investors tends to ride over the market, whereas the uninformed ones losses in the market. The movement in the price gives in to introspection, whether; the individual behaviour does influence the movement in the market. The early studies by Odean (1999) shows that there is a tendency that marketer do refer to the behavioural bias.

Behaviour Finance started its way from Khenman and Trivosky (1971). Thereafter, scholars segregated behaviour of the Stock Market into two parts one being EMH and the other is Bias. These chapters try to assimilate the literature of behavioural finance, especially the herding bias which is the theme of this thesis.

2.2. Literature Survey of Behaviour Finance (other than Herding)

2.2.1. Gamblers Fallacies

Kahneman and Tversky (1970) describe the heart of gambler's fallacy as a misconception of the fairness of the laws of chance. One major impact on the financial market is that investors suffering from this bias are likely to be biased towards

predicting reversals in stock prices.Gamblers' Fallacy arises when investors inappropriately predict that trend will reverse and are drawn into contrarian thinking. Gamblers' Fallacy is said to occur when an investor operates under the perception that errors in random events are self-correcting.

Weinstein (1978) studied the price behaviour of newly issued corporate bonds by measuring their excess holding period returns. Excess returns were defined as the difference between the return on the newly issued bond and a portfolio of seasoned bonds are similar to those of Ibbotson (1975) newly issued stock. The offering price in this case is below the market equilibrium price but the aftermarket is efficient. Weinstein (1978) found a .383% rate of return during the first month and only a.06% rates of return over the next six months, in conformation of this theory.

2.2.2. Consumer Panic

William and Bonfield (1989) made a study on understanding consumer panic: in a sociological perspective and were of view that no consumer behaviour theory directly addresses collective action such as fads and fashions, stock market movements, runs on nondurable goods, buying sprees, hoarding, and banking panics. Theory developed from panic literature in sociology has potential for adding to the understanding of collective consumer actions. They presented a panic paradigm along with a preliminary test of that paradigm.

2.2.3. Information Cascade

Welch et al. (1992) studied the Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades. They observed an informational cascade occurs when it is optimal for an individual, having observed the actions of those ahead of him, to follow the behaviour of the preceding individual without regard to his own information. They

argue that localized conformity of behaviour and the fragility of mass behaviours can be explained by informational cascades.

2.2.4. Bubbles and Crashes

Rappoport and White (1993) studied Bubble in their study "Was There a Bubble in the 1929 Stock Market?" They studied the American stock market by examining the pricing of loans to stock brokers. They found that information on the lenders' perceptions of the future course of stock prices in 1929. From this market, they extract an estimate of the bubble in stock prices. Their findings suggest that bubble component contributes significantly to explain stock price behaviour, even though standard co integration tests suggest that there are no bubbles in the market.

Sornette and Zhou (2006) studied whether there is a real-estate bubble in the US. Using a methodology developed in their previous papers, they analyze the quarterly average sale prices of new houses sold in the USA as a whole, in the Northeast, Midwest, South, and West of the USA, in each of the 50 states and the District of Columbia of the USA, to determine whether they have grown at a faster-than-exponential rate which they take as the diagnostic of a bubble. They find that twenty two states (mostly Northeast and West) exhibit clear-cut signatures of a fast-growing bubble. From the analysis of the S&P 500 Home Index, they concluded that the turning point of the bubble will probably occur around mid-2006.

Dutta (2013) studied on An Empirical Investigation into Understanding Whether the Portfolio Perform Better in Bubble Period in Indian Stock Market the paper tries to understand the effect of the steady bubble and bubble bust scenario by constructing

optimal portfolio through application of Sharpe's Single Index Model. He used data from National stock exchange of India through a period of March 2008 to March 2012. Period after 2008 has been taken as bubble and the later period as bubble bust scenario Using NSE as the market index and daily indices from the period mentioned above, the study formulates a cut-off point and selects stocks having excess return of their expected return over the risk free rate of return surpassing this cut-off point. He used the average repo rate of 7.25 during the period of the study as the risk free return. Percentage of an investment in each of the selected stock was decided on the weights assigned to each stock depending on the respective beta value. The stock movement variable represent unsystematic risk, return on stocks and risk free return vis-à-vis the cut –off rate of return. Pre bubble and post bubble single index model for the same stocks that entered the optimum portfolio were judged. It was found that the stocks failed to pass the single index criteria during the post bubble period.

2.2.5. Anchoring

Kristensen and Garling (1997) tested the hypothesis that "in negotiations counteroffers are generated through an 'Anchoring-and-Adjustment process' leading to an effect of the anchor point, and those counteroffers are influenced by changes in reference point which in turn determine whether the anchor point is perceived as a gain or a loss. The negotiation process was simulated with the help of business administration undergraduate students and results showed that the participants treated the proposed selling price as an anchor.

2.2.6. Overconfidence

Barber and Odean (2001) partitioned investors based on gender and, based on the previous psychological research fact that men are more overconfident than women,

tested the theory that overconfident investors trade excessively.They document that men trade 45 percent more than women, and found that men's net returns were cut by 2.5 percent a year while it was 1.72 percent for women, in data gathered from 1991 to 1997.

Kaustia (2004) finds that volume is lower if the stock price is below the offer price, and that there is a sharp upsurge in volume when the price surpasses the offer price for the first time. Furthermore, he observes that there is also a significant increase in volume if the stock achieves new maximum and minimum stock prices, again suggesting evidence of reference price.

2.2.7. Loss Aversion

Grinblatt and Han (2005) argue that loss aversion can also help explain momentum. Specifically, past winners have excess selling pressure and past losers are not shunned as quickly as they should be, and this causes under reaction to public information. In equilibrium, past winners are undervalued and past losers are overvalued.This creates momentum as they misjudge the value reverses over time.

Hong et al. (2005) argues that mutual fund managers are more likely to buy stocks that other managers in the same city are buying. They suggested that one of the major factor impacting portfolio decisions is a word-of-mouth effect by way of social interaction between money managers. The authors also suggest that stock market participation is influenced by social interaction.

2.2.8. Cognitive Bias and Illusion of Control

Masashi and Megumi (2005), in their paper, "Cognitive biases of Japanese institutional investor's consistency with behavioural finance," investigate the cognitive biases to

which Japanese institutional investors are subjects. Investors showed optimism in forecasting market returns, and this tendency was much more significant for domestic markets and for longer forecasting time-horizons. This optimism is consistent with the existence of availability heuristics. Herding behaviour was also detected. In addition, Japanese institutional investors showed loss aversion, as suggested by Tversky and Khainman (1979). The median of the relative weight for loss versus gain was two or three, depending on the amount of possible loss, and this number is consistent with a coefficient of 2.25 for the value function estimated in Tversky and Kahneman (1992). They conclude that the concepts of behavioural finance have universality in the sense that they are pertinent among institutional investors as well as students, and that they are found in Asian country as well as the United States.

Chira, Adams and Thornton (2008) aimed at studying the cognitive biases and heuristics, which, the business students are subjected to. The main purpose of the study was to look at how influenced the students are, by biases, heuristics, and framing effects. The behavioural survey was administered to a sample of sixty-eight students at Jacksonville University in USA during November 2007 by administering a questionnaire and collecting empirical evidence about both undergraduate and graduate business students' own perceptions of bias. The findings concluded that students are less disposed to make the mistake of being overly confident and optimistic when there is more objectivity involved in making the assessment. Students did not display illusion of control tendencies and a tendency to be subject to the familiarity heuristic.

2.2.9. Cognitive Dissonance

Pompian (2006), observed that there is two identified aspects of Cognitive Dissonance that is related to decision making:

(i) Selective perception: where investors only register information, which affirms their beliefs thus creating an incomplete view of the real picture.

(ii) Selective decision-making: Investors are likely to reinforce commitments previously made even though it might be visible that it is the wrong thing to do. This occurs because of commitment to the original decision forcing the investor to rationalize actions, which would allow him to stick to it, even though these actions are sub-optimal.

2.2.10. Investors' Overconfidence

Statman et.al. (2010), in their paper, "Investor overconfidence and Trading volume", study the proposition that investors are overconfident about their valuation and trading skills which can explain high observed trading volume. With biased self-attribution, the level of investor overconfidence and thus trading volume varies with past returns. They tested the trading volume predictions of formal overconfidence models and find that share turnover is positively related to lag returns for many months. The relationship holds for both market-wide and individual security turnover, which they interpreted as evidence of investor overconfidence and the disposition effect, respectively. Security volume is more responsive to market return shocks than to security return shocks, and both relationships are more pronounced in small-cap stocks and in earlier periods where individual investors hold a greater proportion of shares.

Julan Du (2004), in his paper, "heterogeneity in investor confidence and asset market under-and overreaction", develops a behavioural finance model that may explain under reaction and overreaction in asset markets from the perspective of heterogeneous investors with different confidence levels. The model explains the occurrence of under reaction by the sequential entry of investors with different confidence levels in

interpreting earnings shocks. It is shown that in repeated trading episodes with repeated earnings shocks, the average investor confidence level would be higher as a result of the biased self-attribution and confirmatory bias, causing overreaction more likely to occur. Also, the higher average confidence level of investors gauged by the later timing of winding up their asset holding positions also makes overreaction more likely to occur.

2.2.11. Perceived Investment Performance

Javed et al. (2017) worked on behavioural determinants of perceived investment performance by investigate the herding effects over confidence availability bias and representativeness. [Independent Variables] as behavioural determinants of perceived investment performance [Dependent Variable] in case of Pakistan stock exchange (PSX). The main purpose of their study was to identify which biases impact more on Perceived Investment Performance and to identify useful insights from the results of the study that may benefit in this discipline. They had adopted five likert scale questionnaire based on the prior studies as it was satisfying the scenario for industry settings of Pakistan stock exchange. A quantitative cross sectional research design had been used in this study. The regression results findings shows that the herding effects, over confidence, availability bias and representativeness have positive and significant impact on perceived investment performance. They were of view that the study has significance for the individual investors, financial advisors, companies listed in Pakistan Stock exchange and Government as it will affect their decisions positively if they consider these biases before making any investment decisions.

2.3. Studies on Herding

Stein and David (1990) studied herd behaviour and investment with an objective to examine some of the forces that can lead to herd behaviour in investment. Under certain circumstances, managers simply mimic the investment decisions of other managers, ignoring substantive private investment. Although this behaviour is inefficient from a social stand point, it can be rational from the perspective of managers who are concerned about their reputations in the labor market, and decision making within firms.

Welch and Devenow (1996) studied rational herding in financial economics with an objective to briefly describe recent papers on the economics of rational herding in financial markets. Some models can predict perfect herding, in which rational agents all act alike, without any countervailing force. Such herding typically arises either from direct payoff externalities (negative externalities in bank runs; positive externalities in the generation of trading liquidity or in information acquisition), principal-agent problems (based on managerial desire to protect or signal reputation), or informational learning (cascades). They also provided a few pointers related to literature and suggest issues to be addressed in future research.

Banerjee (1997) worked on "A Simple Model of Herd Behaviour" he analyze a sequential decision model in which each decision maker looks at the decisions made by previous decision makers in taking her own decision. This is rational for her because these other decision makers may have some information that is important for her. She then shows that the decision rules that are chosen by optimizing individuals will be characterized by herd behaviour; i.e., people will be doing what others are doing rather than using their information.Then she showed tha the resulting equilibrium is inefficient.

Prechter and Robert (2001) human herding behaviour results from impulsive mental activity in individuals responding to signals from the behaviour of others. Impulsive thought originates in the basal ganglia and limbic system of the brain. In emotionally charged situations, the limbic system's impulses are typically faster than rational reflection performed by the neo cortex. Experiments with a small number of naïve individuals as well as statistics reflecting the behaviour of large groups of financial professionals provide evidence of herding behaviour. Herding behaviour, while appropriate in some primitive life-threatening situations, is inappropriate and counterproductive to success in financial situations. Unconscious impulses that evolved in order to attain positive values and avoid negative values spur herding behaviour, making rational independence extremely difficult to exercise in group settings. A negative feedback loop develops because stress increases impulsive mental activity, and impulsive mental activity in financial situations, by inducing failure, increases stress. The interaction of many minds in a collective setting produces super-organic behaviour that is patterned according to the survival-related functions of the primitive portions of the brain. As long as the human mind comprises the triune construction and its functions, patterns of herding behaviour will remain immutable.

Brozynski et al. (2005) studied the impact of experience on risk taking, overconfidence, and herding of Fund Managers through a complementary survey evidence with an aim to address whether inexperienced fund managers tend to taker higher risks. Higher risk taking may be explained by a higher degree of overconfidence, less herding behaviour, or a lower degree of risk aversion. Since the results concerning the relationship between experience and risk taking in previous studies are rather contradictory they provide complementary survey evidence of 117 German fund managers which can improve our understanding in this field. In line with the results of previous studies, they find that

herding is decreasing with experience while the evidence concerning risk taking and overconfidence is mixed. Nevertheless, their results provide some support for the hypothesis that inexperienced managers do indeed take higher risks.

Demirer et al. (2010), worked on "Do Investors Herd in Emerging Stock Markets? Evidence from the Taiwanese Market". He made two contributions to the literature on investor herds. In the first place, it extends investor herding studies to an emerging yet relatively sophisticated Taiwanese stock market by using firm level data. In the Second place, by employed different testing methodologies designed to test the existence of investor herds and compares the robustness of inferences. They find that the linear model based on Cross Sectional Standard Deviation (CSSD) testing methodology yields no significant evidence of herding among Taiwanese investors. However, the non-linear model proposed by Chang et al. (2000) and the state space based models of Hwang and Salmon (2004) lead to consistent results indicating strong evidence of herd formation in all sectors. They also find that the herding effect is more prominent during down movements of the market.

Economou, Kostakis and Philippas (2011) studied behaviour of herding in extreme market conditions with the help of data's from the Spanish, Italian, Portuguese and Greek Stock markets. The objective was to examine the existence of asymmetric herding behaviour related with return volatility, trading volume, and market returns. Further, they also investigated the presence of herd behaviour during the 2008 global financial crisis. They consider study period of 10 years i.e.1998 – 2008. As per the study they found pronounced Herding during the periods of rising markets in the above stock markets. They found evidences of herding in the Portuguese stock market during periods of down returns and there is no evidence of herding in the Spanish stock market. Finally, it is observed that there is evidence of 'Herding' during the global financial

crisis of 2008 only for the Portuguese stock market and evidence of 'Anti-Herding' for the Spanish and the Italian stock markets. Investor behaviour seems to have been rational for the Greek Stock Market during the Global Financial Crisis.

Bloomfield et al. (2011), in their study entitled, "Confidence and the Welfare of Less Informed Investors", have indicated that less informed investors are over confident in investments. Providing more information to professional investors only could harm the welfare of less informed investors.

lasco et al. (2011) had conducted an study on detecting intentional herding: What lies beneath intraday data in the Spanish stock market with an objective to examines the intentional herd behaviour of market participants, using Li's test to compare the probability distributions of the scaled cross-sectional deviation in returns in the intraday market with the cross-sectional deviation in returns in an 'artificially created' market free of intentional herding effects. They carried the analysis for both the overall market and a sample of the most representative stocks. In addition, a bootstrap procedure had been applied in order to gain a deeper understanding of the differences across the distributions under study. The results show that the Spanish market exhibits a significant intraday herding effect that is not detected using other traditional herding measures when familiar and heavily traded stocks are analyzed. Furthermore, it is suggested that intentional herding is likely to be better revealed using intraday data, and that the use of a lower frequency data may obscure results revealing imitative behaviour in the market.

Moatemri et al. (2013) studied on Herding Behaviour under Markets Condition: Empirical Evidence on the European Financial Markets they had made four main contributions to the literature of behaviour herding. Firstly, it extends the behavioural

researches of herding of the investors on a developed market and mainly on a European market as a whole. Secondly, they examine herding behaviour at the level of industry sectors by using data at the levels of companies. Thirdly, this document estimates the implications of herding behaviour in terms of returns, volatility and volume of transaction. Fourthly, the herding behaviour is revealed as well during the period of the recent global financial crisis in 2007 - 2008 and of Asian crisis. Their results reveal a strong evidence of herding behaviour sharply contributed to a bearish situation characterized by a strong volatility and a trading volume. The repercussion of herding during the period of the recent financial crisis is clearly revealed for the sectors of the finance and the technology.

Jlassi and Bensaida (2014), Studied Herding Behaviour and Trading Volume: Evidence from the American Indexes with an objective to examine the existence "Herding" in the U.S. market. They studied the turnover effect on herding movement by amending the model of Christie & Huang 1995 and Chang et.al 2000. The results indicate the presence of herding and are a long-lived phenomenon in the American financial market. They observed higher level of herding in the S&P 100 index than that of DJIA index. They also found that the volume of trading contributes in increasing asymmetric herding, by applying VAR and Granger causality test, they indicate causal link of herding – trading volume except for liquid market and Herding is more intensified during subprime crisis, which contributes to accentuate and increases it.

Mishra, (2013) had studied "Herd Mentality in Indian Fund Managers. He is of view that investors are not always rational as, there are many instances where emotion and psychology influence their decisions, causing them to behave in unpredictable or irrational ways. Herd mentality represents an irrational group behaviour, which is found even with fund managers too. His finding suggest strong Herding for fund investments

in mid & small-cap segment as compared to that for large and mid-cap segment. For both the segments, sectoral herding was found to be higher compared to corporate holding herding.

Filip and Pochea (2014), had studied Herding Behaviour under Excessive Volatility in Central and East European (CEE) Stock Markets with an objective to investigate Herding Behaviour of investors in five CEE Stock market during the Global Financial crisis, They examine herding behaviour at industry level by using daily data on stock prices from January 2nd 2008 to December 31st 2010 in five industry-groups. To test for the asymmetries of herding behaviour under low and high market volatility. The results suggest weak evidence of herding behaviour in CEE countries over the study period.

Singh and Paliwal (2016) had studied on financial crisis retrospection in behavioural Perspective. Such that in this paper they presented a brief macroeconomic background and then review the market turbulence from a behavioural lens. They are of view that there work will be helpful in avoiding the common psychological traps associated with professional investing and will be important for both investors as well as the regulatory bodies.

Raafat et al. (2009) studied Herding in humans and trends in cognitive sciences. They suggest that herding has a broad application, from intellectual fashion to mob violence; and that understanding herding is particularly pertinent in an increasingly interconnected world. An integrated approach to herding is proposed, describing two key issues: mechanisms of transmission of thoughts or behaviour between agents, and patterns of connections between agents. They show how bringing together the diverse, often disconnected, theoretical and methodological approaches illuminates the

applicability of herding to many domains of cognition and suggest that cognitive neuroscience offers a novel approach to its study.

Tekce.B et al. (2016) in his paper investigates behavioural biases among Turkish individual stock investors during 2011. Using transaction data, and analyze how common disposition effect, familiarity bias, representativeness heuristic, status quo bias factors that affect these biases and there relation to each other including overconfidence and return performance. He finds that biases are common among investors. Male, younger investors, investors with lower portfolio value, and investors with low income, low education regions exhibit more familiarity bias. Female, older investors and investors with high portfolio values are more prone to disposition effect and representativeness heuristic. Individuals in the opposite edge of overconfidence are subject to status quo bias. Overconfidence had a positive correlation with familiarity bias. Representativeness heuristic deteriorates wealth while status quo bias leads to higher trade performance. Familiarity bias has a no monotonic effect on return; lower (higher) levels of it have a negative (positive) effect on return, this is one of the few studies that analyses the biases simultaneously and helps in better understand the relationship among them.

Ramadan, IZ (2015) Studied on Cross-Sectional Absolute Deviation Approach for testing the Herd Behaviour Theory: The Case of the ASE Index with an objective to test the existence Herd behaviour in the Amman Stock Exchange (ASE). Using data on a daily basis for a sample of companies in the Free Float Share Weighted Index during the period from the beginning of the, 2000 to the end of August 2014 by using the Cross-Sectional Absolute Deviation (CSAD) Approach. Their findings suggests the non-linear relationship between the cross sectional absolute deviation of the stock returns and the return of the market portfolio is an inverse relationship (γ^sub 3^ = -

0.179) which indicates decrease in dispersion with the increase in market rate of return, which indicates that investors are taking the herd behaviour.

Javed (2013) examined the existence of herding behaviour of investors in Pakistani stock market. They have taken KSE 100 as a sample for the study as it accounts for almost 86% of Karachi Stock Exchange. Monthly data for companies had been used for the purpose of analysis. Their result does not support evidence of herding in Karachi stock exchange with significantly positive values for dichotomous variables representing extreme market conditions. Similarly in case of the value for squared market returns also found to be negative but insignificant. Based on the monthly return data analysis they does not find any evidence of Herding in Karachi Stock Exchange.

Ionescu (2012), in his paper 'The Herd Behaviour and Financial Instability' tried to study this mechanism by considering various factors like behaviour of Financial market participants, role of information in decision making, banks responsibility regarding the Herd behaviour and has also presented two examples of Herd behaviour (run bank and the "to many to fail" problem) and in order to achieve an quantitative analysis of the phenomenon he had presented three herding measures. He suggested that herding can be either rational and irrational; where irrational is based on psychological factor i.e. which determines course of action and a rational is because of economic and financial booms which sometimes may leads to financial instability.

Javaira and Hassan (2015) had an examination of herding behaviour in Pakistani stock market" with an objective to examine herd behaviour in Pakistani Stock Market through their investment behaviour by taking Daily and monthly data of KSE-100 index from 2002 to 2007 and had followed Christe and Hawang (1995) and Chang et al . (2000) Model to test Herding. Their finding shows no signs of Herding for the study period i.e.

2007 - 2012 in Karachi Stock Exchange. This study proved no evidence of herding due to market return asymmetry, high and low trading volume states and asymmetric market volatility. However, during liquidity crisis of March 2005, Pakistani stock market exhibited herding behaviour due to asymmetry of information among investors, presence of speculator

Belgacem and Lahian (2013) had studied the herding behaviour of investors in 18 European countries around US macroeconomic announcements. By considering daily data from February 3rd 2000 to July 31st 2011 and a large sample of US macroeconomic indicators, and found the evidence that the Intentional herding behaviour intensity decreases when accounting for US macroeconomic news. The herding behaviour is adopted intentionally in some European countries namely France, Switzerland and Portugal while spuriously in Greece. In addition to herding with their respective domestic markets, investors in the first three countries herd around some US macroeconomic announcements, suggesting that these investors reveal a somewhat spurious herding behaviour. Findings support evidence that investors in Belgium, Finland and Ireland adopt rational Investment decision making with regard to their respective domestic markets, but show Pronounced herding behaviour around US announcements mainly the case of Finland and Ireland.

Fu and Lin (2010) had studied the Herding in China Equity Market. They had tried to explore Herding behaviour and investors reactions based on information asymmetry to both the good and bad news in China's equity market. Turnover effect on herding is tested. They had taken Data from January 2004 to June 2009, which includes the financial panic period. They had used HTSD, LTSD, HTAD, and LTAD apart from CSSD and CSAD which most of the authors had used. They do not find existence of Herding Behaviour in China Equity Market, but they showed the existence of

asymmetric reaction that investors' tendency toward herding is significantly higher during market downstream. This study supports in part the turnover effect that low turnover stocks significantly converge to market return than high turnover stocks during extreme market conditions.

Hammami and Boujelbene (2015) in the paper "Investor Herding Behaviour and Its Effect on Stock Market Boom-Bust Cycles" they have tested the presence of investor herding behaviour in the Tunisian stock market. They have added with that, explanatory factors of the occurrence of the probability of stock market booms and busts by combining herding behaviour of investors and economic and financial fundamentals. They observed that investor's exhibit different levels of Herding behaviour—herding strongly exists in both booms and busts of stock market. It is evident from their results that herding behaviour can leads to an increase in the probability of stock market booms. In addition, the economic and financial fundamentals lead to the emergence of Tunisian stock market boom-bust cycles.

Moradi and Abbasi (2012) studied on a test of investors' herding behaviour in Tehran exchange. They examined the presence of participants' herding behaviour in Tehran exchange and surveyed in this paper. Primary evidences indicated that to determine shares values, participants in the capital market use less than quantitative methods and their decisions are more based on rumors and following a limited number of investors in the capital market without especial cause. In addition to that, from the past studies they argued that no new information about fundamental values explains just a little observed price fluctuations in the market. It has been recommended in these studies though long period changes in securities prices relating to base values changes, but due to psychological change of market or events, Short term fluctuations come into existence without any effects on commercial perspective or economic conditions.

Therefore they had, examined the hypothesis of herding behaviour among all selected firms based on the firms yield variance from the market yield at daily and monthly intervals in the whole market distribution in Tehran exchange during 2005 - 2009. The results of research indicate that there is no herding behaviour in Tehran exchange.

Raafat et al. (2009), worked on a paper entitled Herding in humans they suggest that herding has a broad application, from intellectual fashion to mob violence; and that understanding herding is particularly pertinent in an increasingly interconnected world. They laid down an integrated approach to herding, describing two key issues: mechanisms of transmission of thoughts or behaviour between agents, and patterns of connections between agents. Furthermore, they showed how bringing together the diverse, often disconnected, theoretical and methodological approaches and illuminates the applicability of herding to many domains of cognition and suggested that cognitive neuroscience offers a novel approach to its study.

Al-Shboul (2013), worked on an examination of Herd Behaviour in the Jordanian Equity Market. The herd behaviour in the Jordanian equity market before and after the 2008 global financial crisis was examined for herding. He had applied the most common approaches Christie and Hawang (1995) and Chang et al. (2000) to test for herding tendency of the financial and nonfinancial firms. By using the Ordinary Least Squares method (OLS), evidence of the absence of herding tendency is reported in extreme and normal market conditions. For further investigation of tendency Chang et al. (2000) approach is also implemented. The model of Chang et al. (2000) by using the OLS and the Quantile Regression (QR)methods showed for all firms at the median level, the results of QR provide evidence of linear herding after the crisis while no evidence is reported for nonlinear herding. The results of OLS and QR were different for both types of firms. However, for linear herding, the results of both the approaches

are similar. Jordanian investors exhibit a tendency for linear herding in extreme and normal market conditions but cannot have enough power to convert into nonlinear one.

Rahmana (2015), studied Herding where retail investors dominate trading: The case of Saudi Arabia with an objective to examined Herding in the Saudi Stock Market, where more than 95% of the total trading is initiated by the individual investors. Based on the stock data which were readily available, they found evidence of pervasive herding among the market participants. Although herding is prevalent irrespective of market conditions, it tends to get stronger in periods when the market rises and the trading activity intensifies. Traders are found to be indifferent to important stock categories in their herd behaviour. Further analysis suggests that the correlated behaviour of Saudi traders is unlikely to be induced by the common movements in fundamentals. Considering the unique composition of the market clientele, they are of view that these findings can be considered as constituting market level evidence supporting a commonly held belief in the literature that the individual investors are more likely to be noise traders.

Lan (2014) studied Herding Behaviour in China Housing Market with an objective to examines the herding behaviour and the effect on housing market in China at both national and cities levels by using dataset of 30 Chinese provinces and municipal cities residential selling prices from 1998 to 2013. He had used OLS regression and quantile regression method for the study. He found that herding formation is stronger in increasing markets than that in decreasing markets. However during turbulent market conditions and, in the high quantile regression, there is herding activity in decreasing markets. The results also support the asymmetry of herding behaviour in increasing and decreasing markets. By examining the financial crisis on the level of herding behaviour,

investors in China residential housing markets tend to herd before the crisis, and there is no herding behaviour during and after financial crisis by quantitle regression.

Henker et al. (2006) studied on 'Do investors herd intraday in Australian equities?' With an objective to examine whether market wide herding occurs intraday in Aurstilian equities Market. They had used Christie and Hawang (1995) and Chang et al. (2000) models, to test the occurrence of market wide and industry sector herding intraday in the Australian equities market. Their finding does not support existence of either market wide or industry sector occurrence of intraday herding. Their study is a unique, because previous studies have considered the possibility of intraday herding in equities markets. Even if there is little evidence of herding over longer time periods, market frictions and inefficiencies continue to be exploited at least anecdotally by traders with very short time horizons to the detriment of longer term investors.

Thirikwa and Olweny (2015), worked on determinants of Herding in the Nairobi Securities Exchange with an objective to look into herding at the Nairobi securities exchange. The study focused on the way deviations on the returns on individual stocks is influenced by the market performance (returns), market capitalization of the firms, the book-to-market value of the firms and the external market performance. They used daily time series data for the period between 2008 and June 2015.They had used Ordinary Least Square (OLS) regression model to analyze the data. There results showed evidence of herding in the NSE around market performance, market capitalization and book-to-market value.

Brahmana et al. (2012) worked on 'The Role of Herd Behaviour in Determining the Investor's Monday Irrationality 'with an objective to determine whether herding is spontaneous and irrational behaviour causing the day-of-the-week anomaly. In this

paper they had intersected the Christie and Hawang (1995) herd behaviour model with French's (1980), day-of-the-week model in different stages of tests and had used firm-level data and investigate the return dispersion of 846 Bursa Malaysia stocks during 1990–2010.Theyfound that the herding behaviour is the determinant for investor's Monday irrationality, especially in the case of small caps industry.

Khan et al. (2011), studied Herd Behaviour and Market Stress in four European countries with an objective to identify the existence or nonexistence of the herding phenomena by using the method elaborated by Hwang and Salmon, (2000, 2004, 2008 by considering several factors namely market performance, size and book to market on European stock markets i.e. French, German, Italian and English. They had used data from 2003 to 2008, a period which is characterized by two important events: the dotcom bubble and beginning of the crisis (subprime). There findings showed that by and large, there is a presence of herding behaviour in all countries, excluding the periods of market turmoil and crisis.

Singh and Lao (2011), worked on 'Herding Behaviour in the Chinese and Indian Stock Markets' with the objectives to examine herding behaviour in the Chinese and Indian stock markets. The data set used in this paper contains the stock prices and trading volume of the top 300 firms (in terms of market capitalization) in the Shanghai A-Share index (SHA), and the top 300 firms from the Bombay Stock Exchange index (BSE) for the period 1st July 1999 to 30th June 2009, and the same had been collected from Bloomberg. Hwang and Salmon (2001) model had been used by them for the study. There findings suggest that herding behaviour exists in both the markets. The level of herding is determined by market conditions. In the Chinese market, herding behaviour is found to be greater when the market is falling and the trading volume is high. On the other hand, in India the study finds that herding takes place during up-swings in market

conditions. Herding behaviour is more prevalent during large market movements are large in both markets. In relative terms, a lower prevalence of herding behaviour was detected in the Indian stock market.

Jianhui and Yan (2010), in their paper titled research on collaborative Herding Behaviour and Market Volatility Based on computational experiments argues that previous research had shown synergy of collaborative herding behaviour and market sentiment as one of the internal mechanisms for Stock Market Volatility. In this paper they have considered inter-agent imitation and the simulation of the collaboration of market sentiment signals on a platform of computational experiments. They have used collaborative 'Herding Behaviour Model'. The findings of the paper reveals bubbles or collapse of stock price due to notable collaborative herding behaviour and certain stability of the relationship between herding behaviour and market volatility.

Laih and Liau (2013), worked on 'Herding Behaviour During The Subprime Mortgage Crisis: Evidence From Six Asia - Pacific Stock Markets' with an objective to examine herding behaviour in six Asia - Pacific stock markets, namely, Taiwan, China, South Korea, Singapore, Hong Kong and Japan, during a period of turmoil, particularly in the subprime mortgage crisis. They do not find any evidence of herding in the Singapore and Hong Kong Stock Market, and only partial evidence of herding in the stock markets of South Korea and Japan. However, they found significant evidence of herding in the stock markets of Taiwan and China. There result supports pronounced Herding in developing nations, where markets are dominated by individual investors and where daily price limits are observed. Furthermore, they had empirically verified and visually corroborated the comparative co-movement behaviour between markets with respect to the "home bias reflection hypothesis" and the degree of market openness. They apparent herding behaviour in a rising market state and during post-crisis period is observed.

Lux (1995) studied on Herd Behaviour, Bubbles and Crashes where he had made an attempt to formalize herd behaviour or mutual mimetic contagion in speculative markets. The emergence of bubbles had been explained as a self-organizing process of infection among traders leading to equilibrium prices which deviate from fundamental values. It is stressed furthermore that the speculators' readiness to follow the crowd depends on one basic economic variable, namely actual returns. Above average returns are reflected in a generally more optimistic attitude that fosters the disposition to overtake others' bullish be life sand vice versa. This economic influence makes bubbles transient phenomena and leads to repeated fluctuations around fundamental values.

Shusha and Touny (2016), found in recent times, herd behaviour has gained the attention of researchers in the interpretation of the investment decision-making process in the financial markets. They had explored the attitudinal determinants of herd behaviour of individual investors in the Egyptian Exchange. They had considered four attitudinal determinants which include decision accuracy, hasty decision, overconfidence, and investor mood, and for testing to what extent the effects of these determinants differ according to demographic characteristics of individual investors such as gender, educational level, age, experience, and income. The results indicate that decision accuracy, hasty decision, and investor mood were the main attitudinal determinants that explain why individual investors follow herd behaviour, but the effect of these factors may differ according to the investor's demographic characteristics.

Wylie (2005), the portfolio holdings of 268 U.K. equity mutual funds had been used to test the authenticity of the Lakonishok et al. (1992) measure of Herding and test for Herding among U.K. mutual fund managers. His findings reveal the existence of a modest amount of fund manager herding in the largest and smallest individual in U.K. stocks but little herding in other stocks or stocks aggregated by industry. His findings

were contrary to previous U.S. results and finds that U.K. mutual fund managers tend to herd out of large stocks after high excess returns.

Sias (2014), Institutional investors' demand for a security this quarter is positively correlated with their demand for the security last quarter. He attributed this to institutional investors following each other into and out of the same securities ("herding") and institutional investors following their own lag trades. Although institutional investors are "momentum" traders, little of their herding results from momentum trading. Moreover, institutional demand is more strongly related to lag institutional demand than lag returns. Findings are most consistent with the hypothesis that institutions herd as a result of inferring information from each other's trades.

Zhao (2010) suggested that over the last few decades, more evidences had been found supporting that the investors are not always rational. In the paper herding behaviours have been observed in both the stock market crash as well as financial bubbles. The paper studies the herding phenomenon in the Chinese stock market by using the relationship between stock prices and trading volume over the past seven years. The data of index and volume is daily basis ranging from Jan 01 2004 to Nov 17 2010, SSE Composite Index of Chinese stock market as the market index had been used. The results showed that the change of price is statistically significant to cause the change of trading volume, but the reverse is not true. The paper identifies persistent herding phenomenon in the Chinese stock market.

Olsen (1996) he argues that herding results in a positive bias and lower volatility in earnings estimates than in actual earnings, and he finds empirical evidence to support this hypothesis. He had examined a sample of 520 stocks having at least five analysts' estimates over the 1985–87 periods by constructing five equally weighted portfolios

based on the Value Line earnings predictability index based on prior psychological research that measures the number of standard deviations an actual outcome which lies above or below the average estimated earnings. Their findings shows that forecasted earnings are greater than actual reported earnings which are consistent with the prior researcher. The volatility of the consensus earnings is lower than that of the actual reported earnings estimates and the portfolio with the highest difficulty in forecasting earnings face the greatest negative average abnormal return. Thus, the herding behaviour is more than to offsets the additional compensation based on the CAPM model.

Avery and Zemsky (1998) conducted a study of the relationship between asset prices and herd behaviour. According to the authors, herding arises when there are two dimensions of uncertainty, the existence and effect of a shock. However, this need not distort prices because the market discounts the information that trades reveals during herding. With a third dimension of uncertainty, the quality of trader's information, herd behaviour can lead to a significant mispricing in the short-term.

Bowe and Domuta (2004) investigated the Jakarta Stock Exchange for herd behaviour before, during and after the Asian crisis of 1997. Results indicate that foreign investors herd more than local investors. Furthermore, foreign herding increased more following the crisis, while local herding did not increase and diminished in the post-period following the crisis. Interestingly, domestic herding was positively connected to firm size. Foreign herding had no connection to firm size.

From a European perspective, Gleason et al. (2003) and Gleason et al. (2004) studied the European commodity market and the European exchange of Exchange Traded Funds (ETFs). The overall findings were in favor of rational asset pricing and market

efficiency and as a result, herd behaviour was determined to not be an issue in the European market during times of price fluctuations and market stress.

Nakagawa et al. (2012) studied the Japanese loan market for evidence of herd activities among market participants and the potential impact to the economy as whole. First, it was reported that Japanese financial institutions followed herd behaviour across different types of financial institutions. Secondly, it was observed that herd behaviour by financial institutions generated negative correlation with the GDP and land prices for several periods. As an interpretation of these results, the authors argued that the unstable correlation between herding and the economy might imply that loans made by herding of financial institutions could cause inefficiency of financial markets and destabilizing the real economy in the form of decline in GDP and land prices.

Boyson (2010) investigated reputational herding among hedge fund managers between 1994 and 2004. As an underlying hypothesis, career progression by hedge fund managers is used as a motivation. Furthermore, the author argues that senior managers that deviate from the herd have a higher probability of failure than their less-senior counterparts and do not experience higher fund inflows. These incentives should encourage managers to herd more as their careers progress. The evidence gives wide attribution to this hypothesis as experienced managers were found to herd more than less-experienced managers.

Lu et al. (2018) presented a new methodology of investigating the market crash by networking stocks of sharing common mutual funds in Chinese Market.It is surprisingly revealed that the herding, which origins in the mimic of seeking for high diversity across investment strategies to lower individual risk, will produce too-connected-to-fail stocks and reluctantly boosts the systemic risk of the entire market. Though too-connected

stocks might be relatively stable during the crisis, they are so influential that a small downward fluctuation will cascade to trigger severe drops of massive successor stocks, implying that their falls might be unexpectedly amplified by the collective panic and result in the market crash. There findings suggest that the whole picture of portfolio strategy has to be carefully supervised to reshape the stock network.

2.3.1. Studies on Herding (Indian Studies)

Chandra (2009), studied on Individual Investors' Trading Behaviour and the Competence Effect with an objective to analyze the impact of competence of individual investors on their trading behaviour in the stock market. Individual investors are seen trading too frequently. This impacts their returns from their investments, their belief in the stock markets, and also the functioning of financial markets to some extent. Investors with high level of competence tend to trade more frequently. While some factors affect individuals' perception towards external issues, some affect their belief in themselves, which in turn, influences their confidence and belief in their own judgment and decision making. This holds true in the context of investors in general and individual investors in particular. Individual investors take trading decisions based on their self-perceived competence that is influenced by several factors. He identified the factors that determine individual investors' competence and examined the trading behaviour of individual investors by using a modified questionnaire. A survey of 250 individual investors across the Delhi-NCR (National Capital Region) was undertaken to collect the primary data and used a competence model to assess the competence effect on trading frequency of individual investors. Based on the findings of the survey data, the study explores the individual investors' trading behaviour in the stock market.

Prosad et al. (2012) examined herding behaviour in Indian Equity Market. They have checked the presence of herding using data from National Stock Exchange (NSE) and

methodology as described in Christie and Hawang (1995) and Chang, Cheng and Khorana (2000). Security return dispersion as a function of aggregate market return was taken as a proxy for herding behaviour. To check for the presence of herding simple linear regression models and linear regression models using quadratic functional form have also been applied. Previous studies have entertained the presence of herding behaviour in emerging Asian economies. However no evidence has been found in developed economies. The result of the study endorses the fact that Indian markets are quite efficient as no case of severe herding has been reported. However when presence of herding behaviour was checked for market stress periods, it was advent in bull phase.

Das (2012), studied on 'Small Investor's Behaviour on Stock Selection Decision: A Case of Guwahati Stock Exchange'. The paper aims at identifying the factors which influencing the stock selection decision. The study follows a qualitative methodology to investigate small investor's behaviour in choosing stocks in Guwahati stock market. The purpose of this study is to examine the role of various socio-economic, demographic and attitudinal factors affecting the investment decision of investors in the market. He collected primary data from 100 small investors living in Assam and linked with Guwahati Stock Exchange during the period between June and July, 2011 through a structured questionnaire. It is found that majority of the sample small investors in Assam took into consideration all the 38 factors before selecting the stocks to invest. According to the sample small investors of Guwahati Stock Exchange, the average value of the top five highly influential factors were 'Financial statements of companies' with a mean value of 4.90, 'Referral' with a mean value of 4.86, 'public information' with a mean value of 4.72 and 'Profitability variable's' with mean value of company's of 3.84 and so on. According to sample small investors, there were four factors with the lowest priority or which had low influence on the Stock Selection Decision. These

are ‘Government policies’ (1.66), ‘Calculation of risk’ (1.86), ‘Economic variables’ (2.24) and ‘Discounted cash flow tools’ (2.54) and so on.

Vijaya (2014), Studied on An Empirical Analysis of Influential Factors on Investment Behaviour of Retail Investors’ In Indian Stock Market: A Behavioural Perspective” The paper aims at identifying the factors influencing the retail investor’s behaviour in Indian stock market. She used, Principal Component analysis to find out the determinants of individual investment behaviour, and had identified five major factors that can influences retail investor’s investment behaviour in Indian stock market. They are Overconfidence, Anchoring, Loss Aversion, Herd behaviour and Market factors. His findings will be useful for investors to understand common Behaviours, from which justify their reactions for better returns and also helpful to the financial planners to device appropriate asset allocation strategies for their clients.

Saumitra and Sidharth (2012), studied on applying an alternative test of herding behaviour: a case study of the Indian stock market The paper presents an alternative approach to test the herding behaviour in the Indian equity market using symmetric properties of the cross sectional return distribution instead of the traditional standard deviation of the portfolio-based approach. Using the proposed approach, they find evidence of herding in the Indian market during the sample period and also observe pronounced herding during the 2007 crash in the Indian equity market. Finally, they also observed that the rate of increase in security return dispersion as a function of the aggregate market return is lower in up market, relative to down market days, which stands contrary to the directional asymmetry documented by McQueen, Pinegar, and Thorley (1996).

Mangesh and Rao (1999), aggregated investment by foreign institutional investors (FIIs) in the Indian stock market is significant compared to that by domestic institutions and individual (retail) investors, to know, whether FIIs exhibit herding and positive feedback trading while investing in the Indian stock markets. The daily data on purchases and sales of securities by FIIs sourced from the Securities and Exchange Board of India (SEBI), and the Bombay Stock Exchange (BSE) had been considered and. the approach of Lakonishok et al. (1992) and Wermers (1999) had been applied to examine herding and positive feedback trading by foreign investors. There results suggest that FIIs exhibit herding and positive feedback trading during different phases of the stock market. This observed behaviour is prominent in but not restricted to large cap stocks as they enjoy better liquidity.

Basu and Vaidyanathan (2013), in their paper had tried to identify the presence of 'market-wide herding' in the Indian capital market and whether Institutional Investors impact such Herding. In particular, the paper looks at the impact of FII Flows as well as mutual funds on herding and had also concentrated on the impact of index return and volatility on herding. They had used the Hwang and Salomon (2004) model for identifying market wide herding. It is observed that herding exists on the Indian market, but is not very severe. FII Flows or normalized FII Flows does not significantly impact the herding behaviour; i.e., overall market-level herding is not impacted whether the FII Flows increase or decrease. An interesting finding is that the mutual funds increase the herding tendency.

Garg and Gulati (2013) investigated Investors Herding in Indian market. They found the presence of herd behaviour in Indian stock market in extreme market conditions using data from the National Stock Exchange. They had used the measures suggested by Christie and Hawang (1995) and Chang et al. (2000) based on cross-sectional

standard deviation and cross sectional absolute deviation. Empirical results based on daily, weekly, and monthly data indicate that during periods of extreme price movements there was presence of herding in the Indian stock market for the years 2000–2013. But no herding is found during the extremely high and extremely low trading volume days. Owing to the regulatory reforms of the Indian equity market and the intense presence of the foreign institutional investors, investors' behaviour seems more rational, that validates the application of rational pricing models in the Indian stock markets.

Anandadeep (2011), worked on empirical study of herd behaviour of the NSE, to examine the presence of herd behaviour in the S&P CNX Nifty 50 index of the National Stock Exchange of India, which arises out of the informational asymmetries found in the developing economies around the world. A price-based model with logarithmic cross-sectional deviation employing Kalman filter had been used to measure the presence of herding. This study exposes the severe effects of herd behaviour on the Nifty index. He found highly significant herding in the Nifty index on a market-wide level during the period of 1997 - 2008. We also state that this type of behaviour is decidedly exhibited by the market participants of the Nifty index, during the bull runs in the market and correspondingly less exhibited during the bear runs. In addition to that he also examine various factors that occur during the sample period (May 1997 - December 2008) and relates it to the causes of herding in the Nifty index.

Garg and Jindal (2014), studied Herding Behaviour of an Emerging Stock Market, with reference to India to identify existence of Herding Behaviour in the Stock Market of India which is one of the major emerging economies of the world. They had used the measures suggested by Christie and Hawang (1995) and Chang et al. (2000) on National Stock Exchange data by analyzing daily and monthly data from 2000 to 2012. Their

study found that during periods of extreme price movements, equity return deviation tend to increase rather than decrease, which is a signal of the presence of herding in the Indian stock market for the years 2000 - 2012. Owing to reforms in Indian stock market and the increased participation of institutional players, investors' behaviour seems to have become more rational thereby, facilitating the application of rational pricing models in the Indian stock markets.

Singh and Paliwal (2016), studied on 'Financial Crisis Retrospection: A Behavioural Perspective' a theoretical paper where they have highlighted the importance of behavioural finance in recent times and its application due to its alternative approach of looking at economic processes taking place in the capital markets. By relying on the use of psychology and the shortcomings of the human mind, behavioural finance approach is helpful in understanding the mistakes committed by not only the novice but also the professional investors. Further they are of view that in the 2008 financial crisis, behavioural biases affected not just the investors but also market entities such as support and regulatory institutions. In this paper they have highlighted a brief macroeconomic background and then reviews the market turbulence from a behavioural lens. They suggest that insights gained from this paper are likely to help in avoiding the common psychological traps associated with professional investing and are important for both investors as well as the regulatory bodies.

Ranganathan K (2006), Examined fund selection behaviour of individual investors towards mutual funds; with reference to Mumbai city", found that the consumer behaviour from the marketing world and financial economics has brought together to the surface an exciting area for study and research in behavioural finance. As because of this is serious subject analysts treats financial markets as an aggregate of statistical observations, technical and fundamental analysis. A substantial amount of research

awaits this sophisticated understanding of how financial markets are also affected by the "financial behaviour" of investors. Hence, her study made an attempt to examine the related aspects of the fund selection behaviour of individual investors towards mutual funds, in the city of Mumbai and it showed the way for further research in this field.

Shollapur and Kuchanur (2008), in their article, "Identifying perceptions and perceptual gaps: A study on individual investors in selected investment avenues", investors hold different perceptions on liquidity, profitability, collateral quality, statutory protection, etc., for various investment avenues. In addition, they fix their own priorities for these perceptions. The formation of perceptions triggers the investment process in its own way, often leading to unrealistic apprehensions especially among individual investors. This study attempts to measure the degree of investors' agreeableness with the selected perceptions as well as to trace the gaps between their perceptions and the underlying realities. Failure to deal with these gaps tends to lead the investment clientele to a wrong direction. Hence, there is a need to help investors develop a realistic perspective of the investment avenues and their attributes.

Mittal and Vyas (2008), in their paper, "personality type and investment choice: An empirical study", explains that investors have certain cognitive and emotional weaknesses which come in the way of their investment decisions. This paper classifies Indian investors into different personality types and explores the relationship between various demographic factors and the investment personality exhibited by the investors. The results of this study reveal that the Indian investors can be classified into four dominant investment personalities- casual, technical, informed and cautious.

Bhatta. M (2009), in his paper, "Behavioural Finance- A discussion on individual investor biases", in his article, an attempt has been made to throw light on the investors' biases that influence decision making process. Empirical studies have time and again proved that the irrational behaviours have caused stock market bubbles and crashes. The knowledge so developed through the studies would provide a framework of behavioural principles within which the investors react. The article suggests for a time bound program to educate and counsel the individual investors about the wisdom required in stock trading and be aware of unethical and tactical practices of brokers, shady dealings of the companies and the insider trading.

Dutta et al. (2016) analyzed the presence of herding behaviour in the Indian stock market by taking into account the daily tick data from the National Stock Exchange of India. A group of 50 stocks of various capitalizations and the Index had been used for 10 years i.e. from 2006 to 2016 (both year inclusive). The had used the methodology given by Chrishtie and Haung (1995) where securities market return dispersion had been used as a proxy for herd behaviour. Previous studies on Indian market using the same method or other filter techniques have reported that there has been no evidences of severe herding in Indian stock market and therefore it is efficient. This study observes the existence of periodic herding and that the market is semi-strong in its form in India during the study period.

Kumar and Bharti (2017) examined the existence of herding amongst the investors and market participants in Indian equity market, specifically in a IT sectoral index .They have applied the methodology of Chang et al. (2000), based on cross sectional absolute deviation (CSAD).The study employed the daily closing values of CNX Nifty IT index and its constituents' scripts for a time frame of 6 years ranging from April 1st 2009 to October 31st 2015. Their analysis fails to provide any conclusive evidence of herding

in the IT sector stocks in Indian stock market both in normal period as well as in bullish and bearish phase. They concluded that investors do not indulge in imitation buying rather they take informed decisions based on available information.

2.4. Research Gap

It is observed that most of the studies are conducted in relation to foreign markets. Studies on Indian Market are few and far between. That apart the time frames of the studies are different. As we understand that behaviour of the market keeps on changing across different time period, as the out layer of the data changes with time frame. Hence, this study is directed at understanding and tracing herding in a new time frame to differentiate from the other studies done earlier. The study will try to improve on the gap by providing a more recent frame of time i.e. from 2006 to 2016. This period has observed several lows' in the market as the great depression of 2008-10 falls within this period. Several lows and highs (marked on stress period) in the market has been observed in the year 2012, 2013 and 2014. Hence it would be appropriate to study heading during these periods.

2.5. Conclusion

This chapter provides detailed theoretical background and a comprehensive literature review on behavioural finance and various behavioural biases categorized under different heads with special focus on herding and panic behaviour in various financial markets. Herding in financial markets can be defined as mutual imitation leading to a convergence of action. Herding is an anomaly of efficient market. Because of its wide implication this topic has much relevance for both practicians and academicians.

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CHAPTER 3

RESEARCH DESIGN

3.1. Introduction

In India, the stock market had witnessed strong growth in the last few decades due to the keen interest from both foreign as well as domestic investors. Investing in stock market is a complex process and involving many factors before the investment decisions are taken. These includes the fundamentals, social, psychological, cognitive and emotional factors. The traditional finance theories emphasize the belief that investors are rational and unbiased agents and the market is efficient in different forms. The portfolio theory explains that investors are risk averse and they construct their portfolio to optimize the expected return on an accepted level of systematic risk. Depending upon the degree of information assimilation, the efficient market hypothesis explains that stock prices reflect all the information available about the stocks at any point of time. The behavioural finance challenges the traditional theories with theoretical and empirical evidence and explained number of anomalies and behavioural biases, which causes for mispricing of assets and lead to market instability and inefficiency.

The chapter describes the methodology adopted in conducting the study. The need and the relevance of the study is elaborated, the objectives of the study are established, hypotheses are drawn and the methodology adopted to test hypotheses is explained along with the scope and the limitations of the study.

3.2. Construct of the Study

The study of Chiang et al. (2007) on the Asian crisis stressed on the contagion and herding behaviour. High correlation coefficients in all markets were perceived as

indicating herding behaviour. They identified two phases of the crisis. The first phase was characterized by increasing correlation in stock returns. The second phase was characterized by consistently higher correlation between stock returns. A probable explanation according to the authors is that in the first phase of the crises. The main focus of investors were on local country information, hence contagion market is an obvious. However, as the crisis becomes public news, the investor decisions tend to converge due to herd behaviour, which in turn leads to higher correlations. Similar to the results of Corsetti et al. (2005) who finds existence of contagion from the Hong Kong Stock market to both emerging and industrial countries Billio and Caporin (2010) find some evidence of contagion between the US and the Asian markets in their empirical study.

In the second phase, the cross-sectional dispersal in stock returns or in response to large market movements is a measurement for herding behaviour and the empirical approach of their study, which is also referred to as market-wide herding (Hwang and Salmon, 2004). The pioneers in the field Christie and Hawang (1995) examined the US stock market and suggested that herding among investors is more likely to occur or visible during periods of market stress. The cross-sectional standard deviation (CSSD) of equity returns is used as a measurement for dispersion. They were of view of that, a decrease in dispersions during market stress indicates the presence of herding. Furthermore no evidences of herding in the US stock market was found. In their paper Chang et al. (2000) suggested a similar but less stringent method to examined herding in the market. They investigated the US and Asian markets, by using cross-sectional absolute deviation as a measurement for dispersion. They find significant evidence of herding in Taiwan and South Korea, both of which are emerging countries, however partial evidence of herding was found in Japan. To be specific, herding was found when

market was down. The authors find no evidence of herding in the US and Hong Kong market. This findings were in line with the evidence of Christie and Hawang (1995). Asymmetry of dispersions as a function of the aggregate market return was found across all the markets and, there was less increase in dispersion during down-market days.

The methodology of Christie and Hawang (1995) and Chang et al. (2000) is widely used and accepted as a measurement for herding and several studies have applied their methods or modified versions. Large amounts of studies on herding are focused on the Asian markets. Demirer and Kutan (2006) find no evidence of herding behaviour in the Chinese equity market, whereas contrasting results were found in the Chinese market by Tan et al. (2008). They examined herding in both Shanghai and Shenzhen dual-listed A-share and B-share stocks. A-shares are dominated by domestic individual investors and B-shares mainly consist of foreign institutional investors. They find presence of herding among Shanghai A-share and B-share stocks. Interestingly, herding among Shanghai A-share investors is found to be more vigilant during rising market conditions. Further evidence of herding in the Chinese equity market is presented by Chiang et al. (2010). Similar to Tan et al. (2008), they examined herding in both Shanghai and Shenzhen A-and B-share markets. As per their study herding was found in A-share markets. They find that herding behaviour was prevalent during both up-and down-markets for A-share investors. However, they also find evidence of herding behaviour in B-share markets only in down-markets. This is inconsistent with the results of Tan et al. (2008). In addition to previous studies the authors apply a quantile regression analysis to estimate the herding equation. Supporting evidence for herding is found in both A-share and B-share investors in the low quantile regression. Lao and Singh (2011) found evidences of herding in both Chinese and Indian stock markets. The level of herding is found to be dependent on market conditions. In the Chinese market, herding

behaviour was found to be greater when the market was falling and the trading volume was low which was consistent with e.g. Chiang et al. (2010). For India they found that herding to be more prevalent during up market conditions. Evidence of herding in the Taiwanese market was found by Demirer et al. (2010) with the methodology of Christie and Hawang (1995) and Chang et al. (2000). They found significant evidence of herding, especially during periods of large market movements which is consistent with the results of e.g. Chang et al. (2000). In addition, applying, a method that we will be discussing later, by Hwang and Salmon (2004).

In addition, empirical studies of herding in stock markets other than the Asian have been performed. Henker et al. (2006) shift their focus towards the Australian equity markets. They examined the presence of intra-day and daily herding. No evidence of herding was found in the Australian equity market. The Athens stock market was examined for herd behaviour during the time period 1985 - 2004 by Tessaromatis and Thomas (2009), and found no evidence of herding during the study period. However, when the authors divide the sample into the sub-period 1998 - 2004 evidence of herding behaviour was found in the Athens Stock Market. The time period under investigation was by the authors characterized as period of significance market advances followed by correction. Furthermore, by testing for herding within individual years they reveal that in almost half the year's investment behaviour was found to be consistent with herd behaviour. They suggested that herding or non-herding is not a permanent behaviour among investors. Saastamoinen (2008) studied the Helsinki stock exchange in Finland. In addition to the methodology, proposed by Christie and Hawang (1995) and Chang et al. (2000) a quantile regression was applied. There was no evidence of herding among market participants was found during an average trading day. Evidence of herding in the Helsinki stock exchange is found during up-doing market days. Similar evidence

was found by Ohlson (2010). In his thesis by using data from the OMX Stockholm stock exchange in Sweden. His finding shows evidences of herding in up market days during the time period 1998 - 2008. Furthermore, dividing the sample into sub periods shows evidence of herding in the bullish market of 2005 & 2007. This was consistent with the belief of Christie and Hawang (1995).

Additional research on herding was performed by Chiang and Zheng (2010) who examine the global stock markets. They modified the methodology proposed by Chang et al. (2000), and examined 18 different countries by dividing them into three categories; advanced markets; Latin American markets and Asian markets. Their findings were consistent with previous research, i.e. no evidence of herding behaviour was found in the US stock market. However, they found significant evidence of herding in all the other advanced countries in the study and the Asian markets. Notably, the authors find no evidence of herding behaviour in the Latin American markets. An important contribution to previous research is the identification of the significance of the US market in examining local market herding. Their empirical results indicate that the majority of countries in the study are in fact herding around the US market. This finding suggests that local herding may be influenced by foreign market influences. Consistent with the belief of Christie and Hawang (1995) herding was found during periods of large market movements. Similar to the evidence of Tan et al. (2008) asymmetry of herding was found in Asian markets during rising conditions.

Another measurement for herding was developed by Hwang and Salmon (2004). Their method was based on beta dispersion and was quite different from the methodology of previous studies. Contrary to the results presented in previous studies (e.g. Chang et al. (2000); Chiang and Zheng (2010)) evidence of herding behaviour was found in the US equity market by applying their method. In addition, they find evidences, of herding in

the UK and South Korean markets. According to their empirical evidence herding towards the market shows significant persistence and movements independently from and given market conditions. The authors find results indicating that herding is less prevalent during periods of market stress. This is contrary to the belief of Christie and Hawang (1995) and Chang et al. (2000). Khan et al. (2011) by applying the methodology by Hwang and Salmon (2004) examined herding in four European countries and find evidence of herd behaviour in France, Germany, Italy and the UK. Interestingly, the authors find no evidence of herding during periods of market crisis and turmoil.

3.3. Statement of the Problem

Herding behaviour occurs when market participants observe trades on a particular asset, and then proceed to follow the pattern of trading established by aggregate marketing activity, leading to a major shift into or out of the asset. An important implication of this behaviour is that economic agents tend to rely on the consensus opinions and past trades rather than interpreting news and predictions of fundamental asset pricing frameworks. "The average tendency of a group of managers to buy or sell a particular stock at the same time, relative to what could be expected if money managers traded independently" Lakonishok et al. (1992). Hence the main problems to be identified is been stated below.

The study would look into the evidence of Herding

(1) Does herding occur as an exogenous issue subsequent to the information asymmetry leading to a large number of out layers in stock price?

(2) Does the outlayer of index return effect the Cross-Sectional Standard deviation (CSSD) of selected stocks in the market?

(3) Does the out layer of index returns effect the Cross-Sectional Absolute Deviation (CSAD) of the selected stock in the market?

3.4. Some major Approaches to detect Herding

Previous empirical researches have also implications for the design of this research, in a sense that several methods of measuring herding in stock markets have been proposed.

Bikhchandani and Sharma (2001) noted that the methods of herding behaviour are statistics-oriented, focusing on clustering of decisions. It therefore fails to, recognize the direct linkages between the types of herding, intentional and spurious, and the empirical design used to test for herding. Their explanation behind this is that it is difficult to assert the true fundamentals of herding, and that it is difficult to measure and quantify them.

Lakonishok et al. (1992) defined and measured herding as the average tendency of a group of investors to transact on particular stocks at the same time, parallel to the expectations of independent actions. It thereby aimed at identifying correlation in trading patterns, which need not implicitly represent herding. His method had attracted criticism for disregarding the amount of stock traded, while focusing on the number of investors, and for its shortcomings in identifying Inter temporal trading patterns (Bikhchandani and Sharma, 2001).

Wermers (1999) introduced a new method of measuring herding, the so-called portfolio-change measure of correlated trading. The model defined herding by the extent to which portfolio-weights, assigned to the various stocks by different investors, move in the same direction. Thereby it improves the model proposed by Lakonishok et al. (1992) in its first respect, while it has received criticism for yielding results based on spurious herding.

Thereafter, a growing body of literature analyzed herding in stock markets using measures of dispersion around the market return during periods of significant changes in stock prices (Christie and Hawang, 1995; Chang et al., 2000; Tan et al., 2008, etc.). Christie and Hawang (1995) provided reason for this by arguing that during periods of market pressure movements, stock returns have the tendency to be more clustered, thereby, indicating a co-movement of stock prices, which is independent of their fundamental characteristics. These periods over market stress are then characterized by the formation of herds, since individual investors have a higher tendency to suppress their own beliefs and follow the market consensus. Consequently, cross-sectional dispersion of returns is predicted to be low in the presence of herding behaviour by investors.

More recently, Hwang and Salmon (2004) aimed more towards the cross-sectional variability of factor sensitivities. Their formulation of a herding measure related to the relative dispersion of the betas for all assets in the market. A deeper insight of the dispersion-based measures of herding, together with an alternative proposed by Chang et al. (2000), is provided in the next section, since these methods are the foundation of this research.

3.4.1. The Market-wide Approach

The market wide form of herding are visible when investors in the market neglect the individual characteristics of stocks and instead follow the performance of the market (Henker et al. 2006). The greatest advantage of this particular method is that it is fairly simple.

3.4.2. Prior Models to Detect Market-wide Herding

The pioneering methods to detect market-wide herding were presented by Christie and Hawang (1995) and Chang et al. (2000). In their paper, Christie and Hawang (1995),

suggests that a suitable measure of the market impact of investor herds is dispersion. As it measures the average proximity of individual returns to the market return. Dispersal are bounded from below zero. When individual returns differ from the market return the level of dispersions increase. Thus, market-wide herding would indicate a decrease in dispersal. The cross-sectional standard deviation is used as a measurement of dispersal (CSSD). In addition, the authors suggest that individuals are more likely to follow the performance of the market during periods of large market movements. This means that investors will base their investment decisions only on the performance of the market. As a result individual returns will not differ significantly from the market return. This means that the level of dispersal, i.e. CSSD will be lower than during normal market conditions. This is in contrast to rational asset pricing models were dispersal are assumed to increase during periods of large market movements. The authors also present a measurement for the cross-sectional absolute deviation (CSAD).

In their paper, Chang et al. (2000), extends the work of Christie and Hawang (1995), and presents a modified and less stringent method to detect market-wide herding. They assume, as Christie and Hawang (1995), that rational asset pricing models suggest an increase in dispersion during periods of market stress. In addition, they argue that rational asset pricing models would predict the relation between dispersal in individual assets and the market return to be linear. This means that the dispersal are an increasing function of the market return. As a measurement of dispersal the authors use CSAD which they base on the conditional version of the CAPM (Capital Asset Pricing Model). Hence, the presence of herd behaviour in the market would not only imply a decrease in dispersal but also a non-linear relation between the dispersal and the market return. This means that the dispersal will decrease or at least increase at a less-than-proportional rate with the market return. In contrast to Christie and Hawang (1995) the

method of Chang et al. (2000) is able to detect herding during more normal conditions in addition to periods of market stress.

3.4.3. The Model to Detect Market-wide Herding

The empirical approach of this study is based on the work of Chang and Zheng (2010). In their test for herding they modify the method of Chang et al. (2000). They assume, as Chang et al. (2000), that herding in the market place would imply a non-linear relationship between dispersions of individual asset returns and the return on the market portfolio. They use CSAD as a measurement of dispersion. This means that the cross-sectional absolute deviation will decrease or at least increase at a less-than proportional rate with the market return. Chang and Zheng (2010) uses a measurement of CSAD proposed by Christie and Hawang (1995) since it does not require the estimation of beta. According to the authors, this avoids the potential specification error related to a single-factor CAPM.

3.5. Objectives of the Study

The main objective of the study is to identify the presence of herding and panic behaviour in the Indian Stock Market with reference to National Stock Exchange of India (NSE) during the period of 1st April to 31st March.

(a) To analyze the behaviour of the Investors in Indian stock market.

(b) To analyze the Herding Behaviours effect on the Indian stock market especially with reference to NSE for the period of the study

(c) To analyze the Herding behaviour during stress period such as bull and bear phase with reference to NSE.

3.6. Hypotheses

To examine the existence of herding behaviour, in Indian stock market, the following hypotheses were tested.

The following are the research hypotheses

Market Wide Herding

i) **H_o** = ***There is no presence of herding and panic during the market wide stress phases in NSE,***

Bull and Bear Period Herding

ii) **H_o =** ***There is no presence of herding and panic during the bull phases of NSE,***

The following hypotheses were taken to conduct the study:

iii) **Ho = Herding in the market is not there as the dummy variables coefficient are positive**

Hα = Herding is there in the market as the dummy variable coefficient are negative

iv) **Ho = Herding in the market is not there if $У_1$ and $У_2$ are positive during the up and down periods of the market.**

Hα = Herding in the market is there if $У_1$ and $У_2$ are negative during the up and down periods of the market.

3.7. Research Method

This study mainly uses a quantitative approach. For the quantitative approach market data of all stocks which were part of NIFTY index during the period 2006 - 2016 had

been gathered. The market data is analyzed using statistics, more specifically, regression analysis. In order to determine market wide herding, OLS regressions are estimated. Thus quantitative approach enables a deeper understanding of the investors' behaviour and to see whether herd behaviour is persistent in Indian stock market or not. In addition, secondary data from previous studies is compared with the results of this study. The methods and approach have been explained in detail in later section of the chapter.

3.7.1. Data Description

The data of NSE Nifty has been used for a period of 2006 - 2016 (both years inclusive). The daily Nifty closing value percentage returns has been calculated on a one lag period basis. The stocks which find repeated place on the NIFTY during this period have been shorted out and as many as forty one (42) of such stocks are identified. The return of this stock in percentage through one year lag has been found out using the closing price of the day. Closing price is conventionally used to identify panic and herding as they incorporate the entire days behaviour of the market. Data has been extracted from NSE (www.nseindia.com, and www.yahoofinance.com) website for the given period. There after the study uses the well-established method given by Criste and Hawang (1995). This model is established on a regression model to find the effect of market stress on individual return dispersion. The logic for using NSE data base is due to increase in the size and liquidity of this exchange. It is a fact that NSE is one of the largest markets in terms of trade in Asian Continent.

The study uses a multistep approach to the find the traces of panic and herding. The steps of method and the model specification are given below.

3.7.2. Period of Study and source of data

The study has been conducted for a period of 10 years commencing from April 1st 2006 to 31st March 2016 on National Stock Exchange of India (NSE) comprising of the NIFTY and 50 stock data which are included in the Index. Stock which were constantly part of index over all ten years of study or at least figures for more than five consecutive years have been included. The data has been collected from the official website of National Stock Exchange of India (NSE) www.nseindia.com, and www.yahoofinance.com for the period of the study of all the stock.

3.8. Methods used for calculation

3.8.1. Presence of herding on market as a whole

As discussed, the adopted measurement of herding in this research is based on the return dispersion model by Chang et al. (2000). Before arguing the implications of this model, a more robust background is provided by discussing the return dispersion model of Christie and Hawang (1995) and how it transformed into the model of Chang et al. (2000). Both models analyze herding in terms of cross-sectional stock returns, implying that herd behaviour would lead security returns not to deviate far from the overall market return. The measures aim at the detection of herd behaviour in periods of extreme upward or downward movement in returns. However, since the presence of herding behaviour is not restricted to such periods only, it is also necessary to investigate how this phenomenon evolves over time. It has also been discussed that it is hard to distinguish different types of herding using different measures, since the true fundamentals are difficult to ascertain. Therefore, the cross-sectional methods for asset returns allow to investigate herding using a market-based examination in a sense that it focuses on the closing gap between individual stock returns and the market return.

(a) Christie and Hawang (1995) estimated the cross-sectional standard deviation (hereafter referred to as CSSD) of individual stock returns with respect to market returns. It is expressed as:

$$\boldsymbol{CSSD_{it}}=\sqrt{\frac{\sum_{i,t}^{N}=1(R_{i,t}-R_{m,t})^2}{N-1}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \textbf{(i)}$$

Where,

$CSSD_{it=}$ Cross Sectional Standard Deviation of i stock at t period of time

Rit = the return of i stock for t period of time

Rmt = The return of market for t period of time

N= Number of observations

Next, the CSSD of return was regressed against a constant and two dummies, in order to identify the extreme market phases. Here, Dtl equals 1 if it lies in the extreme 1% and 5% lower tail of the same distribution, and is equal to zero otherwise. The same holds for Dtu in the case of the upper tail.

CSSDt= a+ ßLDtL + ßUDtU + et …… **(ii)**

Where;

$CSSD_t$ = Cross sectional standard deviation to measure individual return dispersion

DLt = The Dummy variable 0 where aggregate return lie in the lower tail of return distribution at 99% of Rm - 3σ.

DUt = The Dummy variable 1 where aggregate return lie in the lower tail of return distribution at 99% of Rm + 3σ.

α, βL and βU = the respective coefficient of the equation

εt = The error term.

CSSD has been used as a measure of individual return dispersion.

Where the coefficient denotes the average dispersion of the sample excluding the regions corresponding to the two dummy variables. According to this approach, herding behaviour is present in the case of statistically significant negative values for β1 and β2t.

It contrasts with rational asset pricing models, which predict an increase in dispersion because individual assets differ in their sensitivity to the market return.

Despite of being an intuitive measure of capturing herding, it has been remarkably affected by the existence of outliers. As a consequence, Christie and Hawang (1995) proposed the use of the cross-sectional absolute deviation (hereafter referred to as CSAD), as a more solid measure of return dispersion:

3.8.2. Non Linearity in herding pattern

Non linearity between dispersion and market return was checked using curve estimate measure.

Another test is conducted to examine the existence of nonlinear relationship between dispersion and Market returns. According to Chang et al. (2000) the return dispersions will decrease (or increase) at decreasing rates, in case of moderate to severe herding. They proposed that this relationship should be negative and nonlinear in presence of herding. The measure of dispersion given by Cheng et al is cross- sectional absolute deviation (CSAD) which is denoted by.

$$CSAD_{i,t^=} \frac{\sum_{t=1}^{N} |R_{i,t} - R_{m,t}|}{N} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(iii)}$$

Where;

CSADit = Cross Sectional Absolute Deviation of i stock at t period of time.

Rmt = daily the market return at date t.

Following general quadratic equation is used to test this behaviour:

$$CSADt = \alpha + \gamma 1 Rm,t + \gamma 2 Rm,t^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad \textbf{(iv)}$$

Where the presence of a negative and significant γ indicates herd behaviour. The stationarioty of CSAD series will be checked.

3.8.3. Presence of herding in bull and bear phase of market respectively

Considering that the stock behaviour may be asymmetric in up and down market phases, the generalized relationship mentioned above can be bifurcated into following;

(i) $\mathbf{CSAD_t^{UP} = \alpha + \gamma_1^{UP}|R_{m,t}^{UP}| \gamma_2^{UP}(R_{m,t}^{UP})^2 + \varepsilon_t}$ ..... **(v)**

(ii) $\mathbf{CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN}|R_{m,t}^{DOWN}| \gamma_2^{DOWN}(R_{m,t}^{DOWN})^2 + \varepsilon_t}$ ..... **(vi)**

Where;

CSADit = Cross Sectional Absolute Deviation of i stock at t period of time.

|RmtUP | = Absolute value of average overall sample return when market is up

|RmtDown |= Absolute values of the average overall sample return when the market is down similar to the previous case, here also negative and significant γ_2^{UP} and γ_2^{DOWN} captures herding behaviour. In addition to the above equation 5 & 6 have been regressed

with CSSD also (dependent variable) just to check the conformity of the result so obtained with CSAD.

3.8.4. Hodrick – Prescott filter

The Hodrick - Prescott filter has been used to decompose the time series and its outlayer. The assumption for the filter is y_t for $t = 1, 2, ..., T$ denote the logarithms of a time series variable. The series y_t is made up of a trend component, denoted by τ and a cyclical component, denoted by C such that $y_t = \tau_t + c_t + \epsilon_t$. Given an adequately chosen, positive value of λ, there is a trend component that will solve

$$\min_{\tau} \left(\sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2 \right). \quad \text{.....(vii)}$$

The first term of the equation is the sum of the squared deviations which penalizes the cyclical component. The second term is a multiple of the sum of the squares of the trend component's second differences. This second term penalizes variations in the growth rate of the trend component.

3.9. Procedure Adopted to calculate the variables used in the study

The method applied in this study was developed by Christie and Hawang (1995) and Chang et al. (2000) and used the following procedure.

Step1. To find out the cross sectional absolute deviation of return (CSSD) for the Sample 41 stocks from NSE NIFTY 50.

a. Find out the daily individual stock return.

b. Find out the daily market return (denoted by Rmt).

c. Deduct Calculated value (Rmt) from each individual stock return series.

d. Find the square value of series step (c) obtained in the above.

e. Find the average of the step (d) by dividing with the number of companies in the sample to get the CSSD series.

Step 2. To find out the cross sectional absolute deviation of return (CSAD) for the Sample 41 stocks from NSE NIFTY 50.

a. Find out the daily individual stock return.

b. Find out the daily market return (denoted by Rmt).

c. Deduct Calculated value (Rmt) from each individual stock return series.

d. Find the absolute value (without Sign) of series obtained in the above step (c).

e. Find the average of the step (d) by dividing with the number of companies in the sample to get the CSAD series.

Step3. To examine the presence of Market wide herding

a. Calculate the (+ 3 SD and -3SD) of the Rmt series

b. find out the Rmt series that falls under above area as mention in point (a).

c. Sort out the Rmt series as found out in (b) into DTU if it falls in +3SD and DTL if falls in -3SD.

d. Consider dummy variable 1 for DTU and 0 for DTL

e. Regress the value of CSSD and CSAD (as dependent variable) separately with the DTU and DTL, along with the error term.

f. Check the coefficient of DTU and DTL in each equation to explain the existence of herding behaviour and a significant negative coefficient explains the existence of herding behaviour in the market.

Step4. To examine the presence of herding in bull and bear phase of the market.

a. Calculate the (+ 3 SD and -3SD) of the Rmt series

b. find out the Rmt series that falls under above area as mention in point (a).

c. Sort out the Rmt series as found out in (b) into DTU if it falls in +3SD and DTL if falls in -3SD.

d. Consider dummy variable 1 for DTU and 0 for DTL

e. Regress the value of CSSD and CSAD (as dependent variable) separately with the DTU and DTL, along with the error term.

f. Check the coefficient of DTU and DTL in each equation to explain the existence of herding behaviour and a significant negative coefficient explains the existence of herding behaviour in the market.

Data for the return on the index as well as individual stock has been calculated by taking percentage log –difference returns from the closing value of the Nifty index using the following formula.

Rmt = Ln (R_1-R_2/R_2), where, R_1 is the closing value the index on the first day , R_2 is the closing value of the index on the second day and Ln is the log of the series. This was converted into monthly series there after by taking the average. This has made the series stationary without change in its characteristics.

3.10. Significance of the Study

As per behavioural finance theories, a large number of social, behavioural and cognitive factors affect investors decision making process. Investor's decision can be either rational or irrational and often the decisions viewed as the outcomes of behavioural or cognitive perspectives of investors. The study is important since previous researches suggests that heard behaviour increases as the size of the group increases and as herding increases, the chance of mispricing of asset will increase and hence reduce the efficiency of the market and the diversification benefit. Analyzing the herding behaviour is important to financial policy makers, investors and wealth

managers to understand better about this behaviour, to cope up the ensuing changes in the market and to take appropriate decisions. Further the knowledge about the existence of herding behaviour in the studied market may help the investors to manage their portfolios since herding is usually associated with sudden swings in the market. A clear picture about the market and the investor sentiments will help one to evaluate the market and for a fair decision making. Identifying emergence, understanding the existence and knowing the determinants of herd behaviour in the stock market helps an investor in many ways and is necessary for formulating his decisions, for self-discipline, to advance his knowledge and to guide others actions. In Indian context, there are not many studies, which analysed this behavioural effect and are very less in number. Out of the available studies, only few studies, examined specifically the intentional herding (rational herding) behaviour in Indian stock market. Since different studies showed different results in emerging markets, examining and confirming the existence of this behaviour is important for domestic as well as for international investors in decision making

3.11. Limitation of the Study

The method proposed by Chang et al. (2000), examines the herding behaviour for extreme market movements and argues that traders are more likely to herd during extreme market conditions. Though the theoretical models provide sufficient explanation, most of the empirical models of herding suffer from the subjectivity involved in defining the extreme market movements. This study also contain with the same Issue. In addition to the above the study has all the limitation which is beard by the secondary data and the limitations of the models used in this study.

3.12. Conclusion

This chapter deals with the various tools and techniques for analysis of the chapter in this study. The chapter also highlights the various hypotheses and the period through which the study was taken. These chapters provide at a glance the research design of the thesis. There are very few methods that have been used by the different authors to identify herding behaviour. Thus most widely used method across different financial markets are the methodology given by Christie and Hawang (1995) and Chang et al. (2000). The study had used the same for detecting herding behaviour in Indian stock Market.

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CHAPTER 4

BEHAVIOUR OF THE STOCK MARKET: A THEORETICAL FRAMEWORK

4.1. Introduction

Standard finance is the body of knowledge built on the base of the few important theories i.e. arbitrage principles of Miller and Modigliani (1969), the portfolio principles of Markowitz, the capital asset pricing theory of Sharpe (1964), Lintner and Black (1965) and the option-pricing theory of Black, Scholes and Merton (1970) (Statman, 1999).These approaches regards markets to be efficient and are highly analytical and normative.

Modern financial economic theory is based on the assumption that the market representative i.e. investors in the economy are rational in two ways: the investors makes decisions according to the axioms of expected utility theory and makes unbiased forecasts about the future. According to the expected utility theory an individual is risk averse and the utility function of an individual is concave, i.e. the additional utility of wealth decreases. Assets prices are determined or set by rational investors and consequently, rationality based market equilibrium are achieved. In this equilibrium securities are priced according to the efficient market hypothesis, which is illustrated in the next section.

4.2. The Efficient Market Hypothesis (EMH)

According to the Efficient Market Hypothesis (EMH), Securities prices incorporate all the necessary available information and prices can be consider as best estimates of true

investment value at all times. The efficient market hypothesis is based on the assumption that people behave rationally, maximize expected utility accurately and process all available information Shiller (1998). In other words, it is of the notion that financial assets are always priced rationally, given what is publicly known. Stock prices approximately describe random walks through time: the price changes are unpredictable since they occur only in response to genuinely new information, which by the very fact that it is new, is unpredictable (Shiller, 2000). Due to the fact that stock prices includes all the information it is impossible to beat the market over time i.e. it is impossible to earn above average profit without taking excess risk.

4.3. Behavioural Finance

The word behavioural finance started to make its round in India, especially in the academic circles during the earlier part of 1990's. The ideas were loosely held, and at the beginning was largely capital market research pertaining to the "Efficient Market Hypothesis" (EMH). By the year 2002, a Nobel Prize in economics to Daniel Kahneman and Vernon Smith in experimental economics and psychology for decision making created waves about the acceptance of behavioural finance as well as grounded a new discipline of finance and economics.

In the early part of nineties as a matter of fact, the studies were very unstructured. However, later, it took a distinct pattern in which the studies were developing. A quick look at the various studies which could be covered under the head of behavioural finance was wide and wild. There were papers written for social psychology, sports performance analysis and applied economic theories which sounded in content to be contributing to behavioural finance.

In order to provide justice to the review a lookout for an appropriate definition was required to cover the works of various scholars under the umbrella of behavioural finance.

Pruden (1995) makes a comprehensive statement as "Behavioural finance is a science that strives to give explanation and improve into the overall judgment process of investors". Recciardi and Simon (2000) defined the field in the following words: "Behavioural finance attempts to explain and increase understanding of reasoning patterns of investors, including the emotional processes involved and the degree to which they influence the decision making process". Both this definition were largely based on the premise that decision by investor is largely influenced by a cognitive process and affected by an emotional aspect which need to be distinguished while individual collect and process the information for the purpose of decision making.

Behavioural finance is a new paradigm of finance, which seeks to supplement the standard theories of finance by introducing behavioural aspects to the decision-making process.

Contrary to the Markowitz and Sharp approach, behavioural finance deals with individuals and ways of gathering and using information. Behavioural finance seeks to understand and predict systematic financial market implications of psychological decision processes. In addition, it focuses on the application of psychological and economic principles for the improvement of financial decision-making (Olsen, 1998).

Earlier than this, during the 1950s and 1960s, the Efficient Market Hypothesis was making its round. The studies were trying to survey market for an effective portfolio management and came to a conclusion that that there were significant effect of information availability over the market prices. Hence, for a techno-fundamental

analysis platform, it was essential for the researchers to understand the relation. This was perhaps the beginning of the Efficient Market Hypothesis (EMH).

Behavioural Finance had taken two pathways for research for the last five decades. The first part was Efficient Market Hypothesis and the second was Market Bias. Since the present study is on one of the 'Bias behaviour' we would cover the various Market Biases in this chapter in detail. The concepts of these is being discussed in this chapter in a chronological manner.

4.3.1. Market Bias and Behaviour

The bias behaviours relate to the particular human behaviour which is affected due to the change in the pattern and structure in which the human beings analyze and assimilate information. So as to understand the behavioural finance it is very essential to know about these biases, because they are becoming one of the major issues in the process of understanding it. Some contextual discussions are being done here to make a clear understanding into such process.

4.3.1.1. Anchoring and behavioural finance

Anchoring refers to the decision-making process where quantitative assessments are required and where these assessments may be influenced by suggestions. People have in their mind some reference points (anchors), for example of previous stock prices. When they get new information they adjust this past reference insufficiently (under reaction) to the new information acquired. Anchoring describes how individuals tend to focus on recent behaviour and give less weight to longer time trends.

"In many situations, people make estimates by starting from an initial value that is adjusted to Yield the final answer. The initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of a partial computation. In either case, adjustments are typically insufficient Slovic and Lichtenstein (1971). *That*

is, different starting points yield different estimates, which are biased toward the initial values. We call this phenomenon Anchoring." Tversky and Kahneman (1974).

Several studies have been conducted in the past which tried to use the concept of anchoring in explaining several aspects of behavioural decisions in finance particularly relating to investment decision and recall for stocks.

Sinha (2015) found that people too often base the value of their stock off of the present asking price of their stock. Added with that, people also fail to adjust from their anchor set price when evaluating their options Sinha (2015). This can be visible when an investor has held a successful stock for a long time and refuses to sell because he views it as a "winner" relative to the price he bought it for originally. However, the past purchase price of a stock excluding its tax consequences does not make any sense, when trying to evaluate the current value of a stock. Dream (1977), analyzing the psychology and the stock market explained that investors take decision on past experiential understanding, which may or may not be from the same area of interest – for example it is not necessary one uses a failure to book profit in stock market as an experience to avoid stock market, it could be a relative loss in some other area as well. The investor will feel rewarded or punished as he anxiously tracks his investment relative to the reference point Hirshleifer (2015). The problem here lies in the fact that the investor is paying too much attention to a superficial reference point, while neglecting to take into consideration the level of his entire wealth. Belsky and Gilovich (1999) explained why investors make wrong decision about investing in right stocks even with good track record of investment. It was observed that these individuals were using positive information processing and were over optimistic in behaviour leading to the fact that they could not make difference between good and bad investment.

4.3.1.2. Behavioural Economic and Behavioural Finance

The area of behavioural economics got a boost after Daniel Kahneman and Vernon Smith was awarded the Nobel Prize in economics for their study in experimental economics and psychology from the area of decision making. The quest for linking human behaviour with economics is quite long. In fact, the path breaking of Ricardo, Keynes and Schumpeter are all in a way look unto the behaviour of human beings when they analyzed demand, marginal return and scale of economy. However, in this context the oldest traceable study had been by Burrell (1951) in his paper of "Possibility of experimental approach to investment studies" where the structure of linkage between economical principles and behavioural structure such as cognitive and non-cognitive approaches were taken up. In a way this study also laid the path for future generation to experiment with experimental economics. Simon (1956) explained in his paper the logic of rational choice under a given economic environment. It is interesting to note that Graham and Dodd (1962) published their book on security analysis where in order to explain the technical factors leading to change in prices of the stocks was analysed. This trend of analysis gave vent to a new area called technical analysis which is so popular today. Essentially, these explanations came as a part of explaining the market environment. Bauman (1961); Lichtenstein (1962) were amongst the early scholars who studied investment experiences, learning bias and adoption by human beings in their doctoral thesis submitted to Indiana University and University of Michigan (both in United states). Payne (1973); Lawrence (1976); Bouwman (1978) and Gilovich (1981) were amongst the others who studies various area of behavioural finance and economics in their doctoral thesis. Apart from studying conventional wisdom in investment analysis, these theses were interestingly from cross functional area like experimental psychology, social psychology and financial economics. One common

line which linked these later studies was the information processing ability in the human being and the dynamics diagnostic possibility through understanding the cognitive process.

Lifson and Giest (1999) explains that investors have several common behavioural patter which are interwoven through experiential learning starting at an early age and acts as behavioural anchors later. Herd and panic are examples of such behaviour which are learned rather than inherited and plays important role in decision making in investment. Slovic (1972) studied the psychological judgment of human beings in respect to investment decision process. He argued strongly on the cognitive base of decision process. Taversky and Kahneman (1981), identified the decision making framework in face of uncertainty. Thaler (1994) studied the quasi rational judgment in economics and identified the factors which distinguish pure judgment from quasi judgment. Wood (1995) in the book behavioural finance and decision explains that the fundamental process of choice of investment occurs as a function of several correlated information processes. Olsen (2000) studied the instinctive decision making in Wall Street and identified few interesting facts which include group dissemination of information and ideological groups which reacts to market information in a certain way. Shiller (2000) studied irrational behaviour patter in respect to commonly defined rational behaviour and came to the conclusion that what looks to be irrational in one frame of time may transform into rational behaviour at a different point of time. Therefore, the decision making processes should not be observed in seclusion and should be analyzed through the looking glass of time. Tope and Lieberman (2001) studied temporal constraint in decision making and observed that judgment of investment had high degree of association with sequential learning. The Gallup foundation in 2012 made a study of the India and correlated the behaviour, financial decision making with that of wellbeing

financially. They concluded that since there has been a fall in the wellbeing post 2000 in India, investors are over conscious about the financial decision.

4.3.1.3. Information Cascade

DeBondt and Thaler (1985) explored whether the stock market over reacts to certain information. In exploring the topic they identified that individual are keener to use information they receive from others than their own wisdom. This happens more at the time of panic. This was echoed by Farrelly (1980) in his work, where he had gestured that the clue to decision under stress is more as a scaffold by others wisdom them personal knowledge. Brokehovich et al. (1994) exploring the role of communication in decision making process for investors identified that information bias occur due to unfiltered information being sought avoiding prudent information generated through learning by an individual. Benabou and Tirole (2006) provided evidence that individual are altruist in their approach and they are more into helping the others causes then use their own judgment for own good. Ariely et al. (2009) provide excellent empirical support for the same theory.

4.3.1.4. Bubbles and Crashes

As noted earlier Bubbles is a persistent economic phenomena which occurs because of information asymmetry. These bubbles are there until a certain rally or change in information occurs. They then burst open and a crash happened. Once a crash opens a bubble occurs and this is a continuous process. Since Kindleburger (1978) article on Manias, Crashes and Bubbles, a lot many studies have followed to explain the cause, nature and duration of a bubble and a crash. With the advent of rational expectation to economic models, bubbles got precisely defined. The rational expectation model provides infinite solution for asset price. One of them is “Fundamental solution” and the others are “Bubble” solutions. The latter is an explosive path of asset price and

constantly deviates from the fundamentals but continues to satisfy the non-arbitrage conditions. This certainly cannot occur in a perfect foresight environment, leading to the insight by the efficient market theorem that Bubbles cannot occur. Blanchanrd (1979); Blanchard and Watson (1982) came forward with the explanation that a bubble can be predicted through a stochastic model but its time of occurrence cannot be ascertained with certainty by rational expectation. This approach has been cited to as "bounded rationality". Abren and Brunnereir (2003) commented that the distinction between rational and non-rational agents may be may be useful by creates epistemological that are not fully resolved and difficult to address. Lux (1998), Lux and Sornettee objectively defined a rational bubble as a condition of asymmetric information in a speculative market and a condition of fat-tail. Grauwe and Grimaldi (2004) developed a model to give a simple model of exchange where agents optimize their portfolio by using different rules.

They used the bubble solution to reach the equilibrium. They were able to discriminate between behavioural bubbles and rational bubbles.

4.3.1.5. Heuristics

The dictionary definition for heuristics refers to the process by which people find things out for themselves, usually by trial and error. Trial and error often leads people to develop "rules of thumb", but this process often leads to other errors (Shefrin, 2000).

"Heuristics are simple efficient rules of the thumb which have been proposed to explain how people make decisions, come to judgments and solve problems, typically when facing complex problems or incomplete information. These rules work well under most circumstances, but in certain cases lead to systematic cognitive biases" – Daniel Kahneman (Parikh, 2011).

There are three heuristic processes; (a) Affect heuristics concerning goodness and badness; (b) Availability heuristics or cognitive heuristics, where an individual depends on available information then other information and (c) Similarity heuristics which relies on "Like causes like" and "appearance equal reality". The initial studies by Tversky and Kahnneman (1973) and (1974), importantly noted the role of heuristics in decision making. These studies were largely based on establishing the availability heuristics and linked cognitive behaviour with decision taking processes. Heuristic decision process is the process by which the investors find things out for themselves, usually by trial and error, lead to the development of rules of thumb.

In other words, it refers to rules of thumb, which humans use to made decisions in complex, uncertain environments (Brabazon, 2000). Kannemann and Solvic (1982), analyzed the judgment which were taken under uncertainty established that individual discriminate between good and bad based on past information and learning. Tversky and Kahnneman (1986) observed the similarity heuristics while studying the rationale choice making process.

Heuristics may help to explain the reasons behind irrational behaviour of the Market, which is contrary to the model of perfectly informed markets. Heuristic decision-making rules may be required to analysis and understanding of new information, which might later have to be reconsidered. The whole market can initially react in the wrong way.

4.3.1.6. Prospect Theory

Prospect theory is a mathematically formulated alternative to the theory of expected utility maximization. The Prospect theory was originally conceived by Kahneman and Tversky (1979) who later was awarded with the Nobel Prize for Economics. The theory distinguishes two phases in the choice process: the early phase of framing (or editing)

and the subsequent phase of evaluation. Tversky and Kahneman, by developing the Prospect Theory, showed how people manage risk and uncertainty.

This theory says that individuals perceive gains and losses differently. It has also been further found that individual would step up their breakeven expectation as the chance to lose in the time frame increases. Individual place much more weight on the outcomes that are perceived more certain than that are considered mere probable, a feature known as the *"certainty effect"* (Kahneman and Tversky, 1979).

Health and Lang (1999); Robin (2000) and Hens and Vlcek (2005) analyzed investors risk taking behaviour and prospect theory and came to the same findings that a prospect investor make profit against conventional investment wisdom.

The most central element of the prospect theory is the S-shaped value function depicted in Figure 4.1.

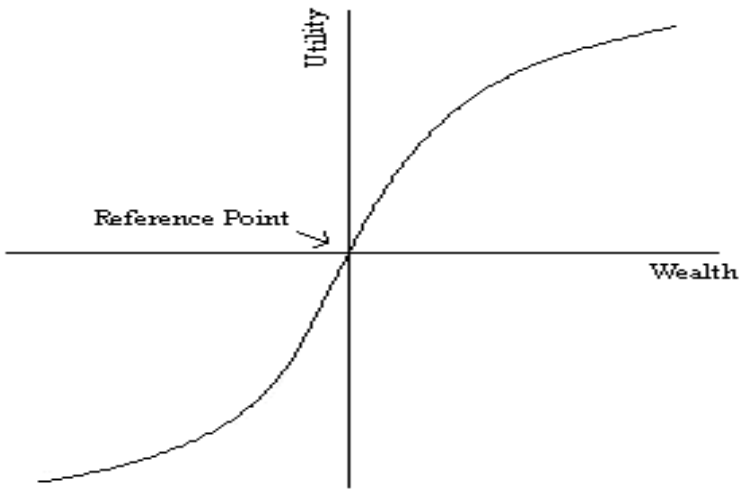

Figure 4.1 Kahneman & Tversky's Value Function.

These two phenomena, the preference for certain outcomes and the preference for risk when faced with losses, discovered by Kahneman and Tversky, may explain some premises of investors' irrational behaviour. The main crux of prospect theory is that

people tend to focus more on changes in wealth, rather than their comprehensive level of wealth Jordan et al. (2015).

4.3.1.7. Regret Theory

There is a human tendency to feel the pain of regret for having made errors, even small errors. It's a feeling of ex post remorse about a decision that led to a bad outcome. If one wishes to avoid the pain of regret, one may alter one's behaviour in ways that would in some cases be irrational. Regret theory may help explain the fact that investors, as explained in the section defer selling stocks that have gone down in value and accelerate the selling of stocks that have gone up in value Shefrin and Statman (1985).

Regret is a psychological error that arises out of excessive focus on feelings of regret at having made a decision, which turned out to be poor, mainly because the outcomes of the alternative are visibly better for the investor to see. The root cause of this type of error is the tendency that individuals hate to admit their mistakes. Because of suffering from this bias, investors may avoid taking decisive actions for the fear that whatever decisions they make take will be sub-optimal in Hindsight.

McAlister (1994) observed that individual who buys branded products will regret to have bought an un-branded product if there is a small difference in quality. In the same spirit investors avoid to sell the stocks which has high value to avoid regret of investing in them in the first place and then to face the vagary of loss.

4.3.1.8. Loss Aversion

Psychologically, people hate losing. In fact, it could be said that people hate losing even more than they enjoy winning. Kahneman and Tversky sought to provide a theory that describes how decision-makers actually behave when confronted with choices under uncertainty. The value function shows the sharp asymmetry between the values that people placed on gains and losses. This asymmetry is called loss aversion. Empirical

tests indicate that people weighted losses about twice as heavily as gains – losing $1 is about twice as painful as the pleasure of gaining $1 (Kahneman and Tversky, 1991). Thaler (1999) called this myopic loss aversion. Myopic means that even investors who have long term horizons appear to care too much about short-term gains and losses Thaler (1999).

This can also be expressed because the phenomena within which people can tend to gamble in losses, i.e. investors can tend to carry on to losing positions with the hope that prices will eventually recover. This is due to the fact that the utility function under the prospect theory is upward sloping for wealth levels under each individual's point of reference. Prospect theory also predicts that investors will be risk averse in gains.

Loss aversion can help to explain the tendency of investors to hold on to loss making stocks while selling winning stocks too early. Shefrin and Statman (1985) called this occurrence of "selling winners too early and riding losers too long" as the disposition effect.

4.3.1.9. Overconfidence

The key behavioural factor and perhaps the most robust finding in the psychology of judgment needed to understand market anomalies is overconfidence. The concept of Overconfidence derives from a large body of cognitive psychological experiments and surveys in which people overestimate both their own predictive abilities and the precision of the information they have been given. People tend to exaggerate their abilities and underestimate the chances of unfavorable outcomes over which they have no control. Psychologists have determined that Overconfidence causes people to overestimate their knowledge, underestimate risks, and exaggerate their ability to regulate events.

According to Shefrin (2000), Overconfidence "*pertains to how well people understand their own abilities and the limits of their knowledge*". Individuals who are overconfident about their abilities tends to think they are better than they actually are. The same applies to knowledge; individuals who are overconfident about their level of knowledge tend to think they know more than they actually do. Overconfidence does not necessarily mean that individuals are ignorant or incompetent. Rather, it means that their view of themselves is better than is actually the case.

Thaler and Barberis (2002) tried to understand why people were so certain about uncertain events. They found that certain events people believe will happen 98% of the time only end up happening 60% of the time (Thaler & Barberis, 2002). Bornstein and D'Agostino (1992) found that repeated exposure to a certain stimulus could lead someone to like that particular stimulus more. Hirshleifer (2015) explained this one step further by claiming an increased familiarity with a particular set of stock can lead an investor to like it more, because in their mind an understanding of the stock reduces risk. Barber and Odean (2001) by classifying investors based on gender and based on the previous psychological research facts that men are more overconfident than women, tested the theory that overconfident investors trade excessively and contrarily there returns fall sharply too.

4.3.1.10. Mental Accounting

Mental Accounting was coined by Richard Thaler and defined by Thaler (1999) as the"*set of cognitive operations used by individuals and households to organize, evaluate, and keep track of financial activities*."

It describes the tendency of people to place particular events into different mental accounts based on superficial attributes (Shiller, 1998). Mental Accounting is the set of cognitive operations used by individuals and households to organize, evaluate, and keep

track of financial activities. This result in a tendency for people to separate their money into separate accounts based on a variety of subjective reasons.

The critical mistake that too many investors make is that they fail to treat their money as fungible, and therefore end up violating rationality by failing to maintain a comprehensive view of all of their assets and desired outcomes ("From Psychology," 2004).

One example of mental accounting materializing in a real-life situation can be seen when comparing two practically identical scenarios involving a lost movie ticket. In scenario one, the moviegoer realizes she has lost her ticket upon arriving at the movie theater, while in scenario two, the moviegoer realizes that she has lost an amount of cash equivalent to the value of her ticket at the door ("From Psychology," 2004). Studies have shown that the woman who loses her actual ticket is very likely just to go home, as she presumably does not want to pay twice to see the same show ("From Psychology," 2004).

However, the woman who loses the equivalent amount of cash consistently proceeds to buy a ticket at the door ("From Psychology," 2004). Seemingly, the first moviegoer placed the lost ticket in the movie theater mental bucket, and since that bucket had already been depleted, she was unwilling to buy another ticket. However, the second movie goer seemed to charge the lost cash to a "general revenue" mental bucket, making it unrelated to the ticket purchase ("From Psychology," 2004). This type of model has held true across many different platforms as people consistently treat equivalent amounts of value differently based off of which mental bucket they allocate that value to. Mental Accounting refers to the codes people use when evaluating an investment decision.

4.3.1.11. Hindsight Bias

Shiller (2000) describes Hindsight bias as "t*he tendency to think that one would have known actual events were coming before they happened, had one be present then or had reason to pay attention*".

The term hindsight bias refers to the tendency individuals ought to view events as more predictable than they really are. Before an event takes place, while you might be able to offer a guess as to the outcome, there is really no way to actually know what's going to happen.

After an event occurs, individuals usually believe that they *knew* the result of the event before it actually happened. That is why it is most of the time also referred to as the "I knew it all along" phenomenon. After your favorite team loses the Super bowl, you would possibly feel convinced that you just knew they were going to lose (even though you did not feel that outcome before the game.)

Monti and Legrenzi (2009) investigated the association between investment decision making and Hindsight bias. They argue that economic studies consider only the agent's foresight perspective, ignoring the possible effects of Hindsight bias in the decision making process. They found strong evidence that Hindsight bias can have on the investor's portfolio decisions: the portfolio allocation perception and therefore, the risk exposure.

4.3.1.12. Chaos Theory

Edwerd Lorenz (1972), analyzed that a small change in the system can lead to a chain of event which can lead to apparently unrelated and unpredictable change. This was popularly called the Butterfly effect. The property of randomness and chaos is very difficult to distinguish between as there are always some computing noises in time series data. Several research in modern times have been in the area of efficient market

most hypothesis and are in fact the outcome of some serious argument in favor of chaos theory. Though it could be hard to relate them to chaos on a random basis yet the spirit of EMH has been flavored by the chaos theory.

Thomas (1990), found evidences that stock price do not fully reflect the implication of current earning for future earning as the noise in the market increases over a period of time leading to a chaos in the market. Ang and Bekaert (2001), observed that the chaos apparent in the stock price behaviour is largely due to the ill-timed information in the market and can be corrected through micro adjustment in the pricing characters.

4.3.1.13. Contrarian Investing

Contrarian investing refers to harvesting profit by investing in unconventional instruments and assets. Contrarian behaviour is a non-explained behaviour and has not been explained by psychology. Contrarian investors believe that crowd behaviour may lead to mispricing of stocks. A common example is investing in "penny stock" which is low value to start with and gain large change which in real terms per stock may look insignificant. Several investment paradoxes are fall out of the contrarian investing. One of these paradoxes is the "winners curse" explained by Rock (1986). In this it had been observed that, investment is done with a predetermined concept that there is mispricing in the market and thereby if one has information of such mispricing then one can make good of the market. For example, the overreaction of the investor in participation of IPO is a glaring example of the same. Each investor try to ride over the underpriced [unexplained by research by Krloharju (1993); Agarwal et al. (2008) and Dutta and Swain (2012)].

4.3.1.14. Illusion of Control

Henslin (1967) identified that individual tend to have control heuristics and the effect of gambling is influence not by the outcome by the control heuristic process. This

essentially mean that individual predetermine his winning by setting a bias to win. Therefore, if the individual loses, then it is taken as a chance and if the individual wins, it is taken as the individuals credit to have out beaten the process of gambling by doing something which is outside their control (for example wearing lucky T-Shirt). Langer (1975; (a) articulated the word "illusion of control as a positive illusion where the individual tends to have a winning behaviour and takes the loss by stride. Langer (1975; (b) named his article "Heads I win: Tail it's a chance" argued in favour of illusion of control and "gain undertaking" (as against loss aversion) process of individuals. McKenna (1993) named it as unrealistic optimism and showed that individual see the occurrence of misery on others and knows it will happen on him too – yet declines to accept it. One of the foremost to study the human agency in social cognitive process is Bandura (1989), who pointed out the social learning is influenced by non-conventional processes and help individuals to take decisions. In a study to understand the prospect theory, Nicolas and Xiong (2006) studied the disposition effect on stock price where they observed that investor uses "control heuristics" to take decision on disposition. Hong and Kecperczuk (2005) studied the buying behaviour of a community for stocks which they called as "sin stock" (Companies which sell tobacco etc.) and tried to understand whether there is any punitive action on the buying of these stocks by the society. In doing so they recalled that investors use a mechanism to overcome their guilt by trying to control the profit gained out of such investment (quit the investment when the company acts badly in respect to the public interest: for example don't keep stock of company which try to sale tobacco to young people). Hunton, McEwen and Bhattacharjee (2001), in their study to understand the risk choice in person investment, they found that control illusion plays a central role deciding the investment pattern of individuals.

4.3.1.15. Gamblers' Fallacy Bias

"*Perhaps the most bizarre argument for being bullish is the belief that markets can't go down for four years in a row. This is a prime example of the Gamblers' Fallacy.*" Montier (2003).

Kahneman and Tversky (1971) describe the heart of gambler's fallacy as a misconception of the fairness of the laws of probability. One major impact on the financial market is that investors suffering from this bias are likely to be biased towards predicting reversals in stock prices.

Gamblers' Fallacy arises when investors inappropriately predict that trend will reverse and are drawn into contrarian thinking. Gamblers' Fallacy is claimed to occur when an investor operates under the perception that errors in random events are self-correcting. For instance, if a fair coin is tossed 10 times and it land on heads on every occasion, an investor who feels that the next flip will result in the other side of the coin i.e. tails can be said to be suffering from this bias.

4.3.1.16. Herding Bias

A fundamental observation concerning the human society is that people who communicate regularly with one another also thinks similarly. It is necessary to grasp the origins of this similar thinking, so that we can judge the plausibility of theories of speculative fluctuations that ascribe price changes to faulty thinking. Part of the reason people's judgments are similar at similar times is that they're reacting to the same information. The social influence has an immense power on individual judgment. When people are confronted with the judgment of a large cluster of individuals, they have an inclination to vary their "wrong" answers. They simply think that all the other people could not be wrong. They are reacting to the information that a large group of people had reached a judgment different from theirs. This is a rational behaviour. In everyday

living we have learned that when a large group of people is unanimous in its judgments they are certainly right Shiller (2000). Herding is one of the common behavioural traits shown by almost all type of creatures in the world and human beings are also not exempted from this. The herd instinct is innate in the human mind and there is a rather widespread tendency among people to behave mechanically or unconsciously imitate what most others do. "Herding theory has its roots in Keynes (1930), who focused on the motivations to imitate and follow the crowd in a world of uncertainty". Herd behaviour denotes the tendency to imitate or follow other individual or groups and this behaviour has been observed not only in financial markets but also in other areas of human life. Herding indicates an inefficient market and this behaviour is explained as a correlated behaviour, which arises when investors suppress their own private information, and imitates or follows others" actions or decisions. This is an accidental spontaneous reaction (unplanned) from the part of an investor to follow others to the negative or positive movement of the market or to the negative or positive price movement of an asset or an industry.

In the stock market herding behaviour is one of the strongest and most dangerous emotional illnesses expected from the investor, which may lead to fairly disastrous results in the market. The herd mentality may be motivated by many factors such as conformity or peer pressure, cascades, fear, fads, reputation and it may arise due to mimicking or imitating a whole group or crowd. The herding may spawn out from a formal or informal groups decisions or may arise due to pseudo consensus, common convention or rituals, bandwagon effect, i.e. trend of following or joining the majority or due to crowd hysteria (e.g. crashes) etc. Usually it is not easy for an investor to keep away from herding or following the crowd and the herding behaviour can create a massive selling or buying in the market. This behaviour

spreads and causes the price either to drop or hike, which eventually leads to the mispricing of assets.

Herding has different stages, in the first stage the investor may look into his surroundings and try to learn what other participants do in the market and he changes according to market and follows others and finally turns in to the bunching up of buying or selling or turns in to mass uniform behaviour. Christie and Hwang (1995) explained herding as the behaviour of an "Individual who suppress their own beliefs and base their investment decisions solely on the collective actions of the market, even after they trouble its prediction" and as a result, the distinction of opinion of investors is relatively small.

Herding in financial markets can be defined as mutual imitation leading to a convergence of action (Hirshleifer and Teoh, 2003) or investors fall into the trap of herding by simply following what those around them are doing with their investment decisions (Jordan et al., 2015). That is why, in financial markets, when the best time to purchase or sell is at hand, even the one that he ought to take action experiences a strong psychological pressure refraining him from doing so. The main reason for this is pressure from or influence by peers. The Reliance Power IPO, 2008 is an example of an instance where many investors subscribed without having full information on the issue. Investors apply to "herd behaviour" because they are concerned of what others think of their investment decisions (Scharfstein and Stein, 1990). Another example of it which appears in Jim Cramer's TV show *Mad Money,* where oftentimes he will recommend a stock, which subsequently sees a large gain the next day (Jordan et al., 2015). Rarely is Jim Cramer presenting new information to the market, but instead he is just reiterating Information that was previously available, and investors are buying the stock because Cramer and those around them are buying it.

Sinha (2015) affirmed that the main reason investors herd is that they consider their own information to be of low quality and that of other investors have higher quality information and thus assign less weight on their own opinions and more weight on others' opinions. Literature regarding the subject explains several kinds of herding behaviour. Imperfect information, reputational reasons, and compensation structures can be the reasons for herding, Bikhchandani and S h a r m a (2001). In general, researchers divide herding into intentional herding (sentiment driven/rational) and unintentional (spurious/irrational) herding. Further, Bikhchandani and Sharma (2001) noted that, "Intentional herding may be inefficient and is usually characterized by fragility and idiosyncrasy"

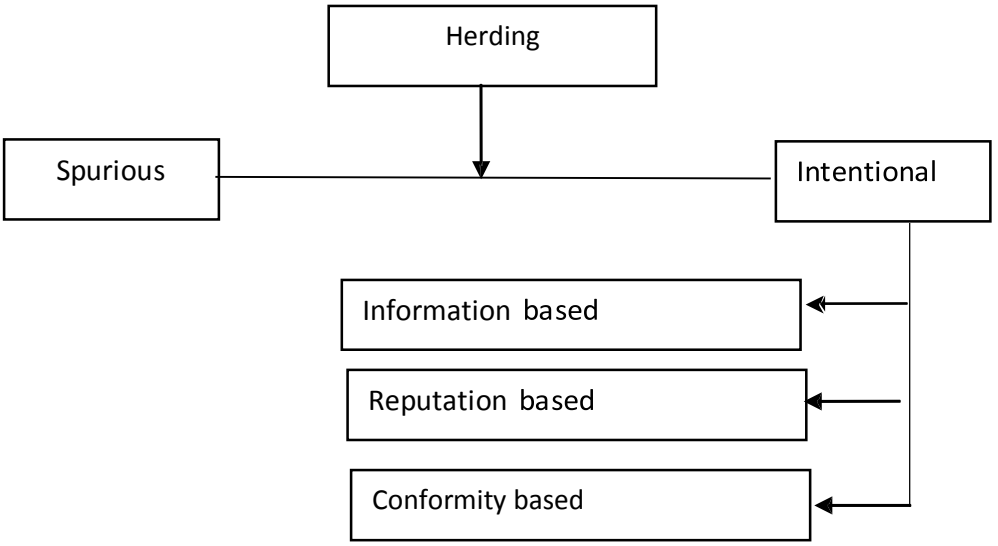

Figure 4.2 Types of Rational Herding

Source: Risk Management, Rational Herding and Institutional Iinvestors, a Macro *View, p-7*

It has been mention in these literature that spurious herding (also known as "unintentional herding"in Lakonishok et al. (1992), Bikhchandani and Sharma (2001), may occur when investors face similar decision problems. This type of herding occurs when similar set of information is available for decision makers and they take

similar decisions without necessarily observing each other because of the simultaneous reaction to certain signals.

Zhou and Lai (2006) explained that spurious herding occurs when the agents react identically to the publicly available information or different opportunity sets faced by investors.

In intentional herding, investors obviously mimic others irrationally. This kind of herding may arise because of informational cascade, reputational or conformity reasons. In information cascades, every individual acts rationally and unintentionally and follows the public choice, independent of their private signals based on their rational choice. Reputational herding assumes that financial analysts make strategic use of an information asymmetry. Scharfstein and Stein (1990) noted that for reputational herding, agents have more correlated signals conditionally on the state of the world and professional managers may disregard their private information and trade with others because they are subject to the reputation risk of acting differently from others. According to De-Long et al. (1990) and Froot et al. (1993), Intentional herding may be either rational or irrational. Further, De-Long et al. (1990) mentioned that pure intentional herding behaviour is closely correlated with the theory of noise trading and Bikhchandani, Welch (1992), Banerjee (1992) added that rational investors take their decision by observing the trading behaviour of other market participants assuming that others have superior information. The outcome of intentional herding may not necessarily be accurate or efficient as the decisions of the investors are based on that of the other participants rather than analyzing the available information, as a result it ultimately leads to instability and excess volatility in the market.

Private investors tend to be influenced by recommendations of popular analysts. Welch (2000) in his study found out analysts could be exhibiting Herding behaviour too. People are influenced by their social environment and they often feel pressure to conform. 'Fashion' is a mild form of herd behaviour while an example of the strong form is fads that Constitute speculative bubbles and 'Crashes'. Herd behaviour may be the most generally recognized observation on capital markets in a very psychological context. Herd behaviour can play a role in the generation of speculative bubbles as there is an inclination to look at "winners" very closely, particularly when good performance repeats itself a couple of times. Christie and Hawang (1995) argue that investors are more likely to suppress their private beliefs in favour of consensus during periods of unusual market movement.

Wermers (1999) performed the most comprehensive study using quarterly holdings data for virtually all mutual funds in existence between 1975 and 1994. Using the Lakonishok et al. (1992), measure of herding, and finds weak evidence of herding taking place in an average stock. He finds greater herding in small stocks, in general. However, small stocks are not typically the preferred holdings of mutual funds. He also finds higher levels of herding in growth-oriented funds than income-oriented funds, which he attributes to smaller stocks being dominant in growth funds. The pioneer study by Lakonishok et al. (1992) on Indian market concludes that pension fund stocks have no evidence of herding. Banerjee (1992) explained that herding exists when "everybody is doing what everyone else is doing even when their private information suggests doing something else." Chang and et al. (2000) pointed out that this behaviour may happen because of high degree of government intervention and due to low quality of information disclosure.

Prosad et al. (2012) analyzed the existence and the nature of herding behaviour in Indian stock market by applying the methodology adopted by Christie and Hawang (1950) and Chang et al. (2000) and find low level of herding in Indian market and opined that Indian market is efficient.

Christie and Hawang (1995) developed a new model and used daily data of NYSE and Amex for the period from July 1962 to 1988, and monthly data of NYSE from December 1925 to December 1988. Both data sets did not show herding during periods of large price movements or market stress. Chang and et al. (2000) using an extended methodology proposed by Christie and Hawang (1995) and using daily data (the period varies 1963 - 1997 for different countries) found that herding behaviour was not present in US and Hong Kong markets during periods of extreme price movements but found significant herding for South Korea, Taiwan and partial evidence of herding in Japan.

Hwang and Salmon (2001), using a new approach, found herding behaviour towards the market portfolio and explained that herding behaviour is more prominent in emerging market (South Korea) as compared to the developed markets like US and UK and herding was more before a crisis and it became weaker during the crisis period. Lin and Swanson (2003) used daily data of 60 large sized firms of Taiwan‟s equity market over the period from December 1996 to June 2003, but did not find evidence for herding towards market consensus.Where as in another study Hwang and Salmon (2004), using the cross-sectional dispersion of monthly CAPM and Fama French betas of S&P 500 and KOSPI index data from 1993 to November 2002, found existence of herding towards the market consensus in both bull and bear market

conditions. The study found less herding during the Asian and Russian crisis and was less pronounced while comparing with the other periods and suggests that efficient pricing may helped by market stress.

Caperrelli et al. (2004) applied the measures of Christie and Hawang (1995); Chang and et al. (2000) and Hwang and salmon (2001) and used the Italian stocks data from September 1988 to January 2001, the study found presence of herding during extreme market conditions. Demirer and Kuttan (2006) used firm level and sector level data from May 1993 to November 2001 and applied the method of Christie and Hawang (1995), but did not find evidence of herding behaviour at firm level as well as sector level in Chinese market.

Tan and et al. (2008), using the extended methodology of Gleason and et al. (2004) found herding present in A-share and B-share markets of Shanghai and Shenzhen stock market during rising and falling markets. It is also noted that both institutional and individual investors herd in the market but the weekly and monthly data showed weaker evidence suggesting that herding was confined to short periods. Amirat and Bouri (2009), examined the presence of individual investors herding behaviour in Toronto stock exchange by using 60 large, liquid Canadian stocks of S&P/TSX60 and the data covers from January 2000 to December 2006. The study applied the models proposed by Lakonishok et al. (1992); Hwang and Salmon (2004); Christie and Hawang (1995) and Chang and et al. (2000) and the first two models showed evidence of herding while the other two did not exhibit herding effect. Barber et al. (2009), using tick-by-tick transaction data for US stock markets over the period 1983–2001, used the herding measure of Lakonishok et al. (1992) and found strong herding by individual

investors. The study also observed that trading preferences of individual investors are more persistent and coordinated.

Naoui (2010), analysed whether investors in Dow Jones index suppress their own prediction of stock's future price and base their opinions on market consensus during extreme fluctuation periods in US stock market. Using the data of 25 companies over the period from January 1987 to December 11, 2009 and applying the method suggested by Christie and Hawang (1995) and the model proposed by Chang et al. (2000) found that herding was present in the studied market. Houda and Abdelfettah (2010), used 10 years weekly data ranging from 1996 to 2006 and methods proposed by Christie and Hawang (1995; Chang et al. (2000) and Hachicha et al. (2008) and found herding with the third measure in the Tunisian market.

Chiang and Zheng (2010), used daily data from May 1988 to April 2009 and the methods proposed by Christie and Hawang (1995) and Chang et al. (2000) and found that herding was present in advanced markets except US and Latin American markets out of seven developed markets, four Latin American and seven Asian markets studied. Belhoula and Naoui (2011), applying the methods proposed by Christie and Hawang (1995) and Gleason and Lee (2003) used the weekly data of American companies listed on the Dow Jones index for the period from January 1987 to December 2011 and found the presence of herding and opined that the investors tend to suppress their private information to follow average market behaviour. Lao and Singh (2011), using the Chinese and Indian data for the period July 1999 to June 2009, used the approach of Tan et al. (2008) found that herding behaviour was greater in the Chinese stock market than the Indian stock market and this behaviour was more visible for

both markets during large market movements. The test for the presence of herding during the crisis period (1st January 2008 - 31st December 2008) showed that significant herding in Chinese market but no herding found in Indian stock Market.

Khoshsirat and Salari (2011), examined the presence of herding at aggregate market level as well as within nine selected industries of Tehran Stock Exchange by applying the method of Christie and Hawang (1995), Chang et al. (2000) from April 2001 to July 2009, but did not find enough empirical evidence for herding in the aggregate market and were able to find herding only in automobile and mineral industries. Holmes et al. (2011), examined the existence of herding behaviour and window dressing using monthly holdings of individual funds in the Portuguese market at different market conditions over the period of 1998 - 2005 and found herding when the market is declining. In addition, the herding coefficient was found to be significant during the post regulation period and during the second month of each quarter, but not during the first or third month within a quarter. Economou et al. (2011), using a survivor bias free data set of daily stock returns for the period January 1998 – December 2008 and applying the methodology of Chang and et al. (2000), found presence of herding behaviour in Greece and Italian markets but no evidence found for Spain and found mixed result for Portugal. The financial crisis did not induce more intense herding behaviour in any of the four markets studied.

My and Troung (2011), examined the existence of investors herding behaviour in Vietnamese market by adopting the methodology used by Tan et al. (2008), and used the measure of Christie and Hawang (1995) for robustness tests. Based on the market development the test were conducted for the whole period and also for two sub

periods covering March 2002 - January 2006 and from January 2006 to July 2007 and found the presence of herding regardless of the periods tested and the models used.

4.3.1.17. Panic

Panic is a sudden sensation of fear which is so strong as to dominate or prevent reason and logical thinking, replacing it with overwhelming feelings of anxiety and frantic agitation consistent with an animalistic fight-or-flight reaction. Panic may occur singularly in individuals or manifest suddenly in large groups as mass panic (closely related to herd behaviour). Panic is studied in financial theory in respect of several illogical run in the market.

4.4. Conclusion

In this chapter we discussed the concepts of various Behaviours in the market.The Behaviours which are in fact the extended learning, fears and greed at times of the collected human mass which are named as investors reflect themselves in the market in a large way. These Behaviours are of interest for those who want to look at the price discovery in the market and the price formation in long and short run. The idea to study behavioural finance emanated from studying the efficient market hypothesis and then went on the experimental economics which gave birth to the concept of Bias in the market.

These biases are of varied kind and make an interesting platform to study the idea of price formation in the market. The chapters that follow will explore the ideas in detail by taking the Indian Stock Market data in place for a given period of time.

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CHAPTER 5

EMPIRICAL EVIDENCES OF HERDING IN NATIONAL STOCK EXCHANGE OF INDIA: RESULTS AND DISCUSSION

5.1. Introduction

The evidences of behavioural bias in the Indian stock market had yield mixed results. Studies by Obidulla (1990, 1992); Gupta (1985); Verma (1988) and Dutta (1998) showed that the markets are random in India and semi-strong with little or no influence by the retail investors on the market.

Studies have further shown that the cognitive biases i.e., affect heuristics, availability heuristics and similarity heuristics had led to systematic error in the market. In the light of this the current chapter discusses the empirical results and findings of the study.

5.2. Method of Study

5.2.1. Data Set and Extraction Method

The data of NSE Nifty has been used for a period of 2006 - 2016 (both years inclusive). The daily Nifty closing value percentage returns has been calculated on a one lag period basis. The stocks which find repeated place on the NIFTY during this period have been shorted out and as many as forty two (42) of such stocks are identified. The return of this stock in percentage through one year lag has been found out using the closing price of the day. Closing price is conventionally used to identify panic and herding as they incorporate the entire days behaviour of the market. Data has been extracted from NSE website for the given period. Thereafter the study uses the well-established method given by Criste and Hawang (1995). This model is established on a regression model to find the effect of market

stress on individual return dispersion. The logic for using NSE data base is due to increase in the size and liquidity of this exchange. It is a fact that NSE is one of the largest markets in terms of trade in Asian Continent.

The study uses a multistep approach to the find the traces of panic and herding. The steps of method and the model specification are given below.

5.2.2. Model Specifications

This section revisits the model specification of the study discussed in the earlier chapter on research design.

5.2.2.1. The Market wide herding model

$$\mathbf{CSSD = \alpha + \beta^{L} D^{L}_{t} + \beta^{U} D^{U}_{t} + \varepsilon_{t}} \quad \text{..... (1)}$$

Where;

CSSD = Cross Sectional Standard deviation to measure individual return dispersion[1]

D^{L}_{t} = The Dummy variable 0 where aggregate return lie in the lower tail of return distribution at 99% of Rm - 3σ.

D^{U}_{t} = The Dummy variable 1 where aggregate return lie in the lower tail of return distribution at 99% of Rm + 3σ.

α, β^{L} and β^{U} = the respective coefficient of the equation

ε_t = The error term.

5.2.2.2. Specification of CSSD

$$\boldsymbol{CSSDt} = \frac{\sqrt{\sum_{i=1}^{N}(Ri,t - Rm,t)^2}}{N-1} \quad \text{..... (2)}$$

[1] Note: The models are being re- specified in order to keep the flow of the reading easy. This models was revalidated by Indian studies of Prosad et al. (2012); Dutta et al. (2016) and Kumar Ashish (2017).

Where,

$R_{i,t}$ = the return of i stock for t period of time

$R_{m,t}$ = The return of market for t period of time

N= Number of observations

5.2.3. CSAD Specification

$CSAD_t$ = Cross Section Absolute std. Deviation and is denoted by

$$CSAD = \frac{\sum |R_{i,t} - R_{m,t}|}{N} \quad \ldots\ldots\ldots\ldots \textbf{(3)}$$

$$CSAD_t = \alpha + y1\, R_{m,t} + y2\, R_{m,t}^2 \ldots\ldots\ldots\ldots \textbf{(4)}$$

5.2.3.1. Calculation for Presence of Panic Related Herding in Bull and Bear phase of the Market respectively

Considering that the stock behaviour may be asymmetric in up and down market phase, the generalized relationship mentioned above may be divided into the following equations as given below:

$$\mathbf{CSAD^{up}_t = \alpha + Y^{UP}_1\, |Rmt^{UP}| + Y^{UP}_2\, |Rm,t^{up}|^2 + \varepsilon_t \ldots\ldots\ldots\ (5)}$$

$$\mathbf{CSAD^{Down}_t = \alpha + Y^{Down}_1\, |Rmt^{Down}| + Y^{UP}_2\, |Rm,t^{Down}|^2 + \varepsilon_t \ldots(6)}$$

5.2.4. Hodrick–Prescott filter

The Hodrick-Prescott filter has been used to decompose the time series and its outlayers. The assumption for the filter is y_t for $t = 1, 2, ..., T$ denote the logarithms of a time series variable. The series y_t is made up of a trend component, denoted by τ and a cyclical component, denoted by c such that $y_t = \tau_t + c_t + \epsilon_t$. Given an adequately chosen, positive value of λ, there is a trend component that will solve;

$$\min_{\tau} \left(\sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} \left[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}) \right]^2 \right). \quad \ldots (7)$$

The first term of the equation is the sum of the squared deviations $d_t = y_t - \tau_t$ which penalizes the cyclical component. The second term is a multiple λ of the sum of the squares of the trend component's second differences. This second term penalizes variations in the growth rate of the trend component.

5.2.5. Hypotheses

The following hypotheses were taken to conduct the study:

(a) Ho = Herding in the market is not there as the dummy variables coefficient are positive.

(b) Hα = Herding is there in the market as the dummy variable coefficient are negative.

(c) Ho =Herding in the market is not there if $У_1$ and $У_2$ are positive during the up and down periods of the market.

(d) Hα = Herding in the market is there if $У_1$ and $У_2$ are negative during the up and down periods of the market.

5.3. Results and Discussions

The results and discussions of the study are put forward in this section.

5.3.1. Descriptive Statistics

Table 5.1 explains the descriptive statistics of the variables used in the study. The data is for the period 01-04-2006 - 31-03-2016. The CSSD denotes cross-sectional a b s o l u t e deviation of returns, calculated as per the equation (2), CSAD which is the cross sectional absolute deviation of the returns (equation 3), CSSD denotes cross sectional standard

deviation of the returns, calculated as per the equation (1), D^UT is the returns falling under the extreme upper tail in the distribution and D^LT is the return falling under extreme lower side of the distribution which are used in the study.

Table 5.1 Summary of Descriptive Statistics.

	CSSD	**CSAD**	**Rmt**	**D^LT**	**D^UT**
Mean	98.62292	15.08616	-0.732712	-52.51984	47.88160
Median	83.02126	12.99807	-0.076190	-45.75952	41.37143
Maximum	1347.266	125.1675	108.2667	-37.85238	108.2667
Minimum	15.24076	2.723923	-121.2452	-121.2452	37.98810
Std. Dev.	64.67584	8.227084	12.78052	20.48719	20.30140
Skewness	6.110991	3.750620	-0.649508	-2.202035	2.709422
Kurtosis	79.18554	32.80364	11.43762	7.226297	8.633360
Jarque-Bera	614958.7	97561.60	7527.985	37.25742	28.00353
Probability	0.000000	0.000000	0.000000	0.000000	0.000001
Sum	244486.2	37398.58	-1816.393	-1260.476	526.6976
Sum Sq.Dev	10365386	167723.2	404760.9	9653.674	4121.469

Source: Computed

For the study period ***CSSD*** reaches *maximum value* of 1347.266 from the base value, and touch the *minimum value* of 15.24076. In overall *average value* of 98.62292 with a *standard deviation* 64.67584. Whereas ***CSAD*** get in touch with *maximum value* of 125.1675 from the base value, and drop down to *minimum value* of 2.723923. In overall *average value* of 15.08616 with a *standard deviation* 8.227084.

Likewise the Rmt. series reaches to the *maximum point* of 108.2667 to the *minimum point* of -121.2452. In overall average value of -0.732712 with a *standard deviation* 12.78052. In the meantime $D^{L}T$ (Rmt belonging to lower tail) reaches to the *maximum point* of -37.85238 to the *minimum point* -121.2452. In overall average DTL of -52.51984 with a *standard deviation* 20.48719. In $D^{U}T$ (Rmt belonging to upper tail) reaches to the *maximum point* of 108.2667 to the *minimum point* of 37.98810. In overall average $D^{U}T$ is 47.88160 with a *standard deviation* 20.30140.

Meanwhile, if we consider the skweness of $D^{L}T$ (-2.202035) shows that it is negative and skewed towards left side of the distribution and that of $D^{U}T$ (2.709422) is positive indicating and skewed distribution to the right side which is the affirmative for the study.

Unit root test were conducted on CSSD series to check if the series was stationary, using the null hypothesis that there is unit root in the series. ADF test was carried out and the value of the test us -7.13 (CSSD) and -22.68 (Rmt) which is higher that the table value of -3.50 at 95 percent level hence the null hypotheses was rejected. This indicates that that CSSD series and Rmt series are stationary. A Granger Causality test was conducted to find if there is substantial causality in the series tested using the null hypothesis that series Y does not Granger cause Y.

5.3.2. Market Wide Herding

Table 5.2 shows the results of market wide herding in the study.

Table 5.2 Results of Regression of Daily CSSD and Rmt in the upper tail as D^UT and lower tail D^LT.

Model	**Beta**	**t-statistics**	**Significance**
Constant	15.268	3.438551	0.00000
D^UT	1.050400	4.866416	0.00000
D^LT	-0.851219	4.439661	0.00000
R Squared	0.520335	Mean Dependent Variable	99.31142
Adjusted R Squared	0.510323	S.D Dependent Variable	63.29135
S.E of Regression	68.45245	Akaike info criterion	11.38440
Log Likelihood	670.7905	Schwarz criterion	12.36411
D.W Statistics	1.978640	Hannan - Quinn criterion	11.34237
Dependent variable CSSD			

Note: D^UT is taken as dummy series 1 and D^LT is taken as dummy series 0.
Source: Computed

Table 5.2 indicates that the coefficients of the regression of the dummy variables at up market when the returns deviation were more than +3 σ and the down market when the return deviations were less than -3 σ with CSSD as dependent variables are negative in the lower tail of the distribution. The t-statistics are significant for both the coefficient at 1.050400 (D^UT) and -0.851219 (D^LT). Both the equations pass the Granger Causality test as mentioned earlier. The coefficients explain the causation sufficiently. The R squared is 0.520335 shows that there is good strength in the equation. The D.W statistics is closing to 2, indicating that there is no autocorrelation in the data. This is a favorable view as observed by Belhoula M (2011), "Theoretically, *Herding* behaviour in *stock markets* has been usually described as a study of close clutter of market return. In those *studies* a DW value close to one is good news as the market returns at a date t lies at the *lower* tail of the returns

distribution." As understood from all the Information criterion, the model is a modest fit and is slightly skewed showing a bias to lower tail of the distribution. Herding is visible in lower tail of the distribution as the $D^{L}T$ (Rmt belonging to lower tail) have a negative (-0.851219) coefficient with 0.0000 *P* value, whereas the equation yield no herding in the upper tail of the distribution. Akaike information criterion and Hannan - Quinn information criterion are sufficiently large to hold the equation. Both the beta coefficients are significant.

Essentially, therefore, investor herd on the lower tail (Bear rally) and the same was missing in the Upper tail (Bull Rally). This support the theories of Panic which indicate that herding is more visible when persistent bear rallies are observed.

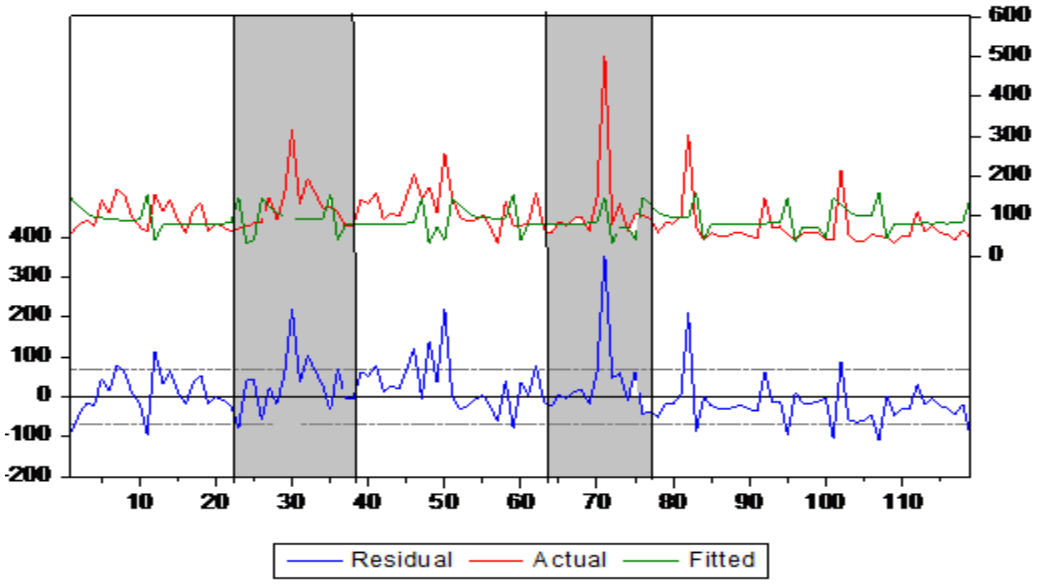

Fig 5.1 Herding pattern in the Market during the Up and down period of the stress.

Figure 5.1 indicates the movement of the market in up (red) and down (green) times and the one below in blue shows the herding. The shaded portion shows the increased herding period. The shaded areas are post filter residual error of the model.

Figure 5.2 also shows the period of lower tail herding in the market during the period of study. It is evident that $D^{L}T$ has herding effect in the figure. Independently, it shows a similar pattern of herding in the market.

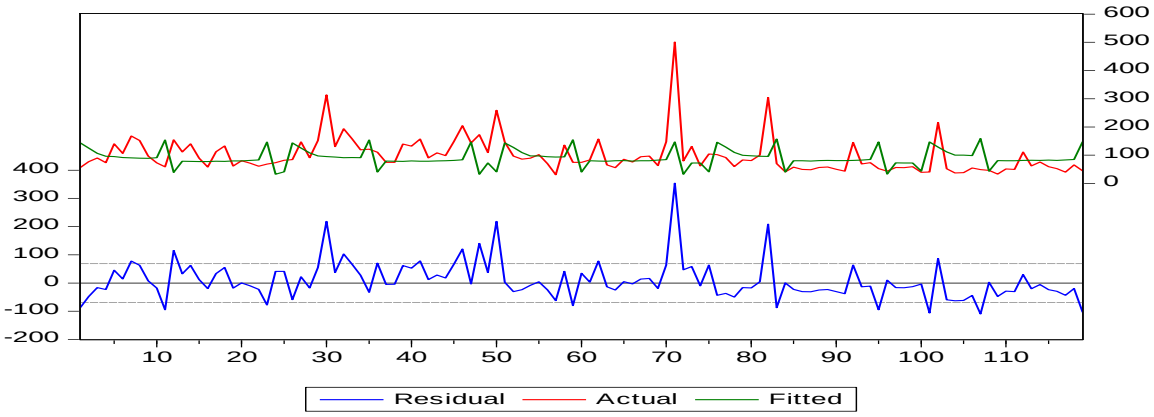

Fig 5.2 Residual Distribution.

Table 5. 3 Results of Regression of Daily CSAD and Rmt in the upper tail as $D^{U}T$ and in the lower tail as $D^{L}T$.

Model	**Beta**	**t-statistics**	**Significance**
Constant	15.368	2.86432	0.00000
$D^{U}T$	0.099345	3.846871	0.00000
$D^{L}T$	-0.172988	-6.498226	0.00000
R Squared	0.632568	Mean Dependent Variable	15.04326
Adjusted R Squared	0.592430	S.D Dependent Variable	9.057658
S.E of Regression	10.13661	Akaike info criterion	10.385685
Log Likelihood	477.0839	Schwarz criterion	11.630248
D.W Statistics	1.932172	Hannan-Quinn criterion	11.503792

Source: Computed
Note: $D^{U}T$ is taken as dummy series 1 and $D^{L}T$ is taken as dummy series 0.

The series of data of Cross-sectional absolute deviation (CSAD) and the dummy variables where the Rmt series that lies in the upper tail and the lower tail (as Dummy series of 1 and 0).

Table 5.3 indicates that the coefficients of the regression of the dummy variables at up market when the returns deviation were more than +3 σ and the down market when the return deviations were less than -3 σ with CSAD as dependent variables are negative in the lower tail of the distribution. If we closely look into the coefficient we can see that the coefficient of $D^{L}T$ and $D^{U}T$ are decreasing at an increasing rate over the study period which indicates the presence of non-linearity in relationship and it happens when people herd towards the market. Herding is observed in the lower tail of the distribution ($D^{L}T$). The coefficient (-0.172988) is negative and statistically significant with probability value (0.0000). Whereas the same was missing in the upper tail of the distribution which has a positive coefficient (0.099345). The R squared is 0.632568 shows that there is good strength in the equation and is satisfactory. The D.W statistics is less than 1.93, shows that there is a variant autocorrelation in the data. As understood from all the Information criterion, the model is a good fit and is slightly skewed showing a bias to one tail of the distribution. This is also supported by the fact the $D^{U}T$ has a larger coefficient than $D^{L}T$. Essentially, therefore, investor herd on the lower tail (Bear rally) and the same was missing in the Upper tail (Bull Rally). This supports the theories of Panic which indicate that herding is more visible when persistent bear rallies are observed.

Herding pattern in the Market during the Up and down period of the stress.

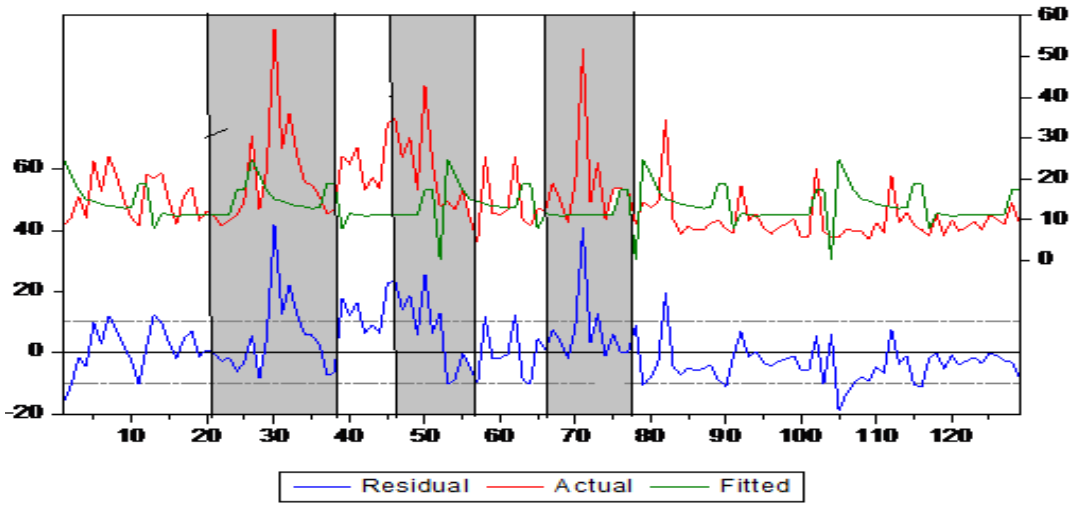

Fig 5.3. Residual Adjusted for Herding.

Note: The Graph at the top indicate the movement of the market in up (red) and down (green) times and the one below in blue shows the herding. The shaded portion shows the increased herding period. The shaded areas are post filter residual error of the model.

The figure also shows the period of lower tail herding in the market during the period of study. It is evident that $D^{L}T$ has herding effect in the figure

5.3.3. Bull and Bear Phase of the Market

Table 5.4 shows the results of test for Bull phases of market in equation (5) taking CSAD up as dependent variable indicates that no Herding prevails when the market is up (as Y_2 up is positive). The coefficients are significant for both the part of the upper tail of the distribution at 5% probability value. However no evidence of herding has been found in when market was up (positive Y_2^{up}). Positive and significant at 5% level which shows that CSAD decreases with increase in market return. This refutes the hypothesis of herding behaviour.

Table 5.4 Results of Regression of Daily CSAD $_{UP}$ and Rmt in the upper tail as D^UT 1 and D^UT 2.

Model	**Beta**	**t-statistics**	**Significance**
Constant	15.49718	6.712247	0.0000
D^UT 1	0.453954	0.222132	0.0044
D^UT 2	0.560612	0.034858	0.0022
R Squared	0.624611	Mean Dependent Variable	13.49095
Adjusted R Squared	0.461379	S.D Dependent Variable	7.609826
S.E of Regression	7.653110	Akaike info criterion	10.937561
Log Likelihood	874.8003	Schwarz criterion	11.997194
Sum squared residuals	14583.54	Hannan - Quinn criterion	
Durbin-Watson stat	1.928131		11.965574

Source: Computed

The R squared is 0.624611 shows that there is good strength in the equation and the model explain the causation sufficiently. The other statistics such as DW statistics, Akaike information criterion and Hannan - Quinn information criterion are in order. Essentially, therefore, we can say that investor does not herd in Upper tail (Bull Rally). This support the theories of Panic which indicate that herding is more visible when persistent bear rallies are observed.

Table: 5.5 Results of Regression of Daily CSAD down and Rmt in the lower tail as D^LT 1 and D^LT 2.

Model	Beta	t-statistics	Significance
Constant	15.46818	6.702247	0.0000
D^LT 1	-0.515857	0.644852	0.0096
D^LT 2	-0.628581	0.838647	0.0025
R Squared	0.624611	Mean Dependent Variable	13.49095
Adjusted R Squared	0.471379	S.D Dependent Variable	7.609826
S.E of Regression	7.633000	Akaike info criterion	10.927561
Log Likelihood	864.8003	Schwarz criterion	11.127194
Sum squared residuals	14583.54	Hannan - Quinn criterion	
Durbin - Watson stat	1.918131		10.955574

Source: Calculated

Table 5.5 shows the results of test for Bear phases of market in equation (4) taking CSAD down as dependent variable indicates that Herding prevails when the market is down (as Y_2 down is negative and statistically significant at 5% probability value). Negative and significant coefficient of $\gamma 2$ explain that the equity dispersion has decreased over the study period and it happen, when people herd towards the market. Further it is noted that the magnitude of Herding is higher or it is more persistent in 2nd part of the lower tail of the distribution with the coefficient -0.628581. Whereas its intensity is low in 1st part of lower tail with the coefficient -0.515857.This is indication of mild panic. The Coefficients are significant for both the part of the lower tail of the distribution at 5% probability value

The R squared is 0.624611 shows that there is good strength in the equation and the model explain the causation sufficiently. The other statistics such as DW statistics Akaike information criterion and Hannan - Quinn Information criterion are sufficiently large to hold the equation. Essentially, therefore, investor herd on the lower tail (Bear rally) and the same was missing in the Upper tail (Bull Rally). This support the theories of herding and panic as more persistent bear rallies continues in the market.

Table 5.6 Results of Regression of Daily CSAD Up and Down and Rmt in the lower tail as $D^{L}T1$ and $D^{L}T$ 2 and upper tail $D^{U}T1$ and $D^{U}T2$.

Model	**Beta**	**t-statistics**	**Significance**
Constant	15.49818	6.702247	0.0000
$D^{U}T$ 1	0.453954	0.222132	0.0044
$D^{U}T$ 2	0.560612	0.034858	0.0022
$D^{L}T$ 1	-0.515857	0.644852	0.0096
$D^{L}T$ 2	-0.628581	0.838647	0.0025
R Squared	0.634611	Mean Dependent Variable	13.49095
Adjusted R Squared	0.461379	S.D Dependent Variable	7.609826
S.E of Regression	7.653000	Akaike info criterion	10.927561
Log Likelihood	874.8003	Schwarz criterion	11.997194
Sum squared resid	14583.54	Hannan-Quinn criterion	11.955574
D.W Statistics	1.918131		

Source: Computed

Table 5.6 shows the results of Individual test for Bull and Bear phases of market taking CSAD as dependent variable (equations 5 and 6) indicate that Herding prevails when the market is down (as Y_2down is negative and statistically significant at 5% significance

interval). Further it is noted that the magnitude of Herding is higher or it is more persistent in 2nd part of the lower tail of the distribution with the coefficient -0.628581. Whereas its intensity is low in 1st part of lower tail with the coefficient -0.515857. The Coefficients are significant for both the part of the lower tail of the distribution at 5% probability value. However no evidence of herding has been found in when market was up (positive Y_2^{up}). Positive and significant at 5% level which shows that CSSD increases with increase in market return. This refutes the hypothesis of herding behaviour in up market. The R squared is 0.634611 shows that there is good strength in the equation and the model explain the causation sufficiently. So the results are consistent with above i.e; both showing herding in the lower tail, only difference is that we find the intensity of herding more in 2nd part of the lower tail unlike CSSD results where intensity of herding was more in 1st part of the lower tail.

Table 5.7 Results of Regression of Daily CSSD Up and Down and Rmt in the lower tail as D^LT 1 and D^LT 2 and upper tail D^UT 1 and D^UT 2.

Model	**Beta**	**t-statistics**	**Significance**
Constant	17.4263	1. 232730	0.0001
D^UT 1	0.569377	1.223400	0.0003
D^UT 2	0.486813	1.599069	0.0001
D^LT 1	-0.826394	1.347800	0.0003
D^LT 2	-0.626427	1.533892	0.0003
R Squared	0.668093	Mean Dependent Variable	116.7697
Adjusted R Squared	0.369035	S.D Dependent Variable	46.07699
S.E of Regression	48.56883	Akaike info criterion	11.07659
Log Likelihood	278.5295	Schwarz criterion	11.23749
D.W Statistics	1.965473	Hannan - Quinn criterion	11.23749

Source: Calculated

Table 5.7 shows the results of Individual test for Bull and Bear phases of market taking CSSD as dependent variable (equations 5 and 6 CSSD as dependent variable) indicates that herding prevails when the market is down (as Y_2down is negative and statistically significant at 5% significance interval). Further it is noted that the magnitude of Herding is higher or it is more persistent in 1st part of the lower tail of the distribution with the coefficient -0.826394. Whereas its intensity is low in 2nd pert of lower tail with the coefficient -0.626427. The Coefficients are significant for both the part of the lower tail of the distribution at 5% probability value. However no evidence of herding and panic has been found in when market was up (positive Y_2^{up}). Positive and significant at 5% level which shows that CSSD increases with increase in market return. This refutes the hypothesis of herding and panic behaviour in up market. The R squared is 0.668093 shows that there is good strength in the equation and the model explain the causation significantly.

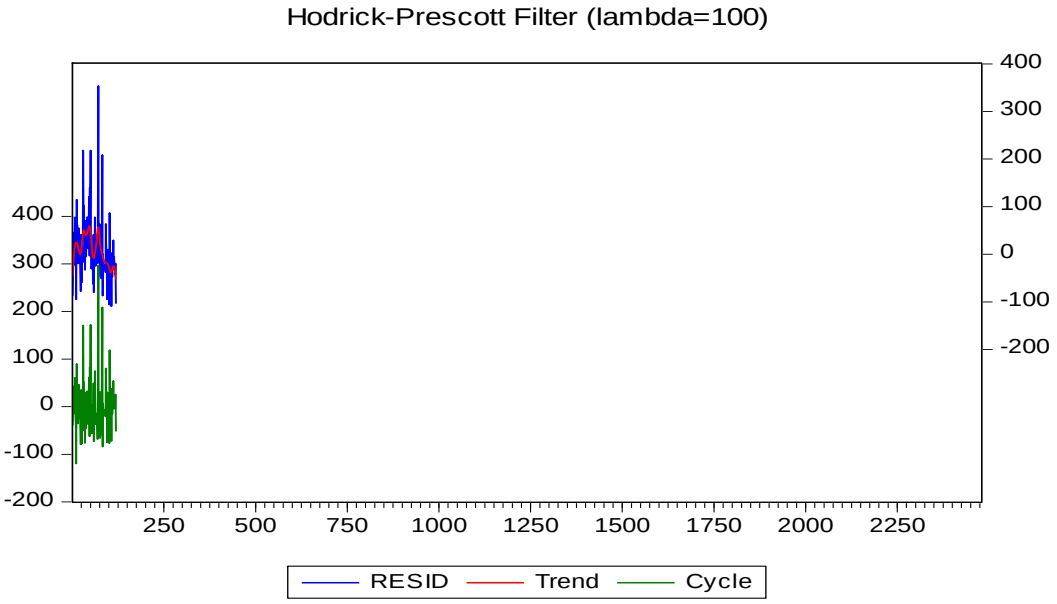

Figure 5.4 Filtered Residual using Hodrick - Prescott.

Figure 5.4 shows the filtered residual cycle where residuals have been filtered using Hodric - Prescott Filter. Filtered cycle shows extreme herding in lower tail of the distribution with moderate herding in the beginning and then severe herding (reflected in figure between 1 and 100) which is consistent with the result of the equation. The trend line is normal indicating herding as uniform in the lower tail.

5.4. Summary of Findings

The dynamics of developing stock markets are complex and it differs from country to country based on number of factors. NSE is one of the curtail stock markets in India. This chapter empirically analyzed the degree of herding behaviour in Indian stock market by using daily data of the 41 constituent scripts of NIFTY 50, a major index of National Stock Exchange. Many models have been proposed over the years to measure herding behaviour and the study adopted methods, a static measure [extended version of Chang et al. (2000) and Christie and Hawang (1995)]. By using the first measure, the study carried out the tests for the whole period to measure the market wide herding behaviour. Whereas the second method was used to measure the bull and bear phase herding. This study used the return of the individual stocks as well as the markets, cross-sectional standard deviation and the cross sectional absolute deviation. The study found existence of herding behaviour in both market wide phase as well as in bull bear phase of the market as a result both the null hypothesis were rejected as the beta coefficients were negative and statistically significant.

5.4.1. Major Findings

Following are the major findings of the study:

(a) There is evidence of market wide herding. However, it is in the lower (negative) tail which has a negative correlation indicating a bear period market wide herding.

(b) There is evidence of market wide panic, as the bear period herding is observed in the negative tail when the dependent variable is absolute deviation.

(c) There is evidences of deep market wide herding and panic as the extreme value of the lower tail (negative) herd of the lower tail (negative) herd more than the upper tail (negative part of the Rmt series.

(d) There is evidence of deep panic as a similar result is found using the CSAD and Rmt where the lower (negative) part of the Rmt series is herding.

(e) There are evidences of bear phase herding in the study period in the market wide phenomena and panic in the same period.

(f) It can be therefore observed that NSE has a deep bear herding and panic phenomena in the market of bear phase during the period of study.

5.5. Conclusion

Analyzing the herding behaviour in a rapidly developing market like Indian stock market is important to financial policy makers, investors and wealth managers to understand this behaviour and the ensuing changes in the market to take appropriate decisions. Further, the actions of investors in the market based on this behaviour may typically affect market movement, lead to mispricing of assets and hence lead to market inefficiency. Through the applied methods, it is found that herding behaviour throughout the studied period and is

visible during the bear phase of the market. This study too, indicates down market bear phase herding. The study further observes deep panic in the down part of the bear market in the context of National stock Exchange (NSE) market which was under study and is representative of the Indian market. The finding is consistent with many other studies which found evidence for herding behaviour in developing markets in similar market conditions. Chang et.al (2000) in the stock markets of South Korea and Taiwan, Chen and et al. (2003) in the Chinese market, Hwang and Salmon (2001) in Europe, Kassim (2008) in Malaysia, Lao and Sing (2011) China and India, Demirer et al. (2010) on Taiwan market Basu and et al. (2011) in Indian market, Degirmen (2012) in developing markets are some of the studies which found herding behaviour in developing markets.

Since the study shows both deep herding & panic as well as market wide herding in the bear phase of market, it is important to note that the concerned authorities should be vigilant during the down town of the market. As a principle, investors would avert loss during a bear phase which in-turn may lead to aggravated herding in the market. In view of this necessary steps should be taken by market as well as the regulators to control a down ride herding and panic.

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CHAPTER 6

FINDINGS, CONCLUSION AND SUGESSIONS

6.1. Introduction

The increased complexity, uncertainty, insufficient and asymmetric information, especially in developing markets made the investment arena tougher and raised many behavioural issues in the market. The liberalization process and the convolution in investment setting made the investment environment stringent and the investment decisions more complex. Further, emerging markets like India are being considered as a dome for investment, since it provides liquidity and comparatively higher return than the developed markets and this in turn invited the attention of key players to these markets. This has made the market participants to perform in Market in different and divergent ways.

Behavioural finance explains that there are many behavioural issues which can be observable in the market and it can seriously influence the price of an asset in the market. The link between asset mispricing and the behavioural issues in attract much attention from the part of researchers and practitioners in both developed and developing markets. There is no consensus in the findings and the results are mixed. Herding behaviour in the stock market is one of the most important but hardly discussed aspects in behavioural finance which has an exorbitant power to influence the market seriously and lead to mispricing of assets and hence causes market inefficiency.

Contrary to investors in developed markets, the investors from the developing markets herd more and may imitate others because of many reasons. These include lack of information or unaffordable cost information or any other reasons like reputational or informational cascade. In the literature one can see many more reasons, which leads the investors to follow others in their investment decisions as noted in the previous chapters. Many researchers argued that herding behaviour is more prone during market stress but literature shows mixed results. One of the major roles of the researcher is to identify appropriate financial information about the effect or the consequence of herding behaviour and communicating this to investors and decision makers. This might lead to a situation avoiding which can result in herding and follow informed judgments and decisions. Even though there are many studies, which examined the different aspects of herding behaviour in emerging markets, the studies in Indian market are far and few between. The present study examine the dynamics of herding behaviour in Indian stock market and is an attempt to fill this gap.

This chapter is designed to analyze the conclusions drawn based on the empirical analysis on the objectives set to examine the different aspects of herding behaviour in the Indian Stock Market. The purpose of this study was to analyze if the Indian stock market (NSE) exhibit market wide herd behavior and bull and bear phase herd behaviour over the time period 2006 - 2016. The study examined the existence of herding behaviour in National Stock Exchange of India, (NSE), by using 10 years daily data of 41 constituent scripts of NSE Nifty 50 and the data spans over the period from 1st April 2006 to 31st March 2016. The study followed Christie and Hawang's and Chang's et al. Model to analyze the existence of herding. By using the first measure, the study carried out the tests for the whole

period to measure the market wide herding behaviour in NSE, whereas the second method was used to measure the bull and bear phase herding in NSE. This study used the return of the individual stocks as well as the markets, cross-sectional standard deviation (CSSD) and the cross sectional absolute deviation (CSAD).

It is assumed that herd behavior is present if negative and significant non-linear relationship exists between CSAD and the market index. Herd behavior models allow determining if group mentality is driving the investors' financial decisions. To understand the behaviour of the market various behaviour that are prevalent in the market have been studied in detail.

6.2. Summary of Findings and Conclusion

6.2.1. Major Findings

Following are the major findings of the study:

(a) There is evidence of market wide herding. However, it is in the lower (negative) tail which has a negative correlation indicating a bear period market wide herding.

(b) There is evidence of market wide panic, as the bear period herding is observed in the negative tail when the dependent variable is absolute deviation.

(c) There is an evidence of deep market wide herding and panic as the extreme value of the lower tail (negative) herd of the lower tail (negative) herd more than the upper tail (negative) part of the Rmt series.

(d) There is evidence of deep panic as a similar result is found using the CSAD and Rmt where the lower (negative) part of the Rmt series is herding.

(e) There are evidences of bear phase herding in the study period in the market wide phenomena and panic in the same period.

(f) It can be therefore observed that NSE has a deep bear herding and panic phenomena in the market of bear phase during the period of study.

6.2.2. Summary of Conclusion

Behavioural finance became one of the most talked factors in the recent history of finance. The importance of behavioural finance is increasingly growing in discussions and many researchers are showing keen interest in this area of finance and discuss many issues in the financial market, which arises due to different behaviour shown by the investors.The analysis of different behaviour and its consequences helps the investors, policy makers, wealth managers and other interested parties for a better understanding of the market and the asset, for pricing the risk associated with the assets and formulating and improving their decisions in the market.

As discussed in the previous chapters, examining herding behaviour in Indian stock market is important and this study contributes to the herding literature in many aspects. The study analyzed the existence of herding behaviour in one of the important emerging market, India (NSE).

The dynamics of developing stock markets are complex and it differs from country to country based on number of factors. NSE is one of the crucial stock markets in India. This Study was focoused on understanding various behavioure that are advent in the market and to empirically analyzed the degree of herding behaviour in Indian stock market by using daily data of the 41 constituent scripts of NIFTY 50, a major index of National Stock Exchange. Many models have been proposed over the years to measure herding behaviour and the study adopted methods, a static measure [extended version of Chang et. al.and

Christie and Hawang]. By using the first measure, the study carried out the tests for the whole period to measure the market wide herding behaviour. Whereas, the second method was used to measure the bull and bear phase herding.This study used the return of the individual stocks as well as the markets, cross sectional standard deviation and the cross sectional absolute deviation.

For understanding the concepts of various behaviours in the market we find that behaviours which are in fact the extended learning, fears and greed at times of the collected human mass which are named as investors reflect themselves in the market in a large way. These Behaviours are of interest for those who want to look at the price discovery in the market and the price formation in long and short run. The idea to study behavioural finance emanated from studying the efficient market hypothesis and then went on the experimental economics which gave birth to the concept of Bias in the market.

These biases are of varied kind and make an interesting platform to study the idea of price formation in the market. Which was explored in subsequent objectives.

Analyzing the herding behaviour in a rapidly developing market like Indian stock market is important to financial policy makers, investors and wealth managers to understand this behaviour and the ensuing changes in the market to take appropriate decisions. Further, the actions of investors in the market based on this behaviour may typically affect market movement, lead to mispricing of assets and hence lead to market inefficiency.

Through the applied method the study found evidences of herding in both market wise phase as well as in bull and bear phase during the study period in National stock exchange of India as the beta coefficients were negative and statistically significant indicting rejection of both the null hypothesis. To be more precise the study finds down market bear

phase herding. Further the study shows deep panic in the down part of the market. This sign that the investors tend to show this behaviour when the market is under stress rather in bullish condition. It is important to note that the concerned authorities should be vigilant during the down town of the market. As a principle, investors would avert loss during a bear phase which in-turn may lead to aggravated herding in the market.The finding is consistent with many other studies which found evidence for herding behaviour in developing markets in similar market conditions. (Stock markets of South Korea and Taiwan, Chinese market, Europe, Malaysia, China and India, Taiwan market,Indian market, are some of the studies which found herding behaviour in developing markets). . In view of this necessary steps should be taken by market as well as the regulators to control a down ride herding and panic.

6.3. Suggestions

A large number of researchers had examined the existence and the asymmetric effect of herding behaviour in developed and emerging markets. For India, the studies are very few studies, which examined the herding behaviour. The general view is that, the tendency of herding is more in the developing markets and literature explains many reasons like informational asymmetry, transparency, informational cascade and reputational reasons. From this study, it is clear that, there exist herding behaviour in Indian Stock Market i.e. investors are prone to herding. The authorities should consider this fact and should take initiatives to educate the investors about the herding behaviour and its consequence in the stock market since it leads to asset mispricing which in turn leads to market inefficiency. The study brings the following suggestions for the policy perusal.

I. Reduce information Asymmetry

Existence of herding behaviour will create market inefficiency and mispricing of assets and this ultimately leads to the loss of confidence of investors. Hence, the authorities should take necessary control measures to avoid herding in the market and should encourage the rational investment concept among investor. These are possible by introducing more vibrant and fair market system and also by reducing information asymmetry.

II. Warning Signal by the Government to Investors

It has been found from the literature that the crises period (2008) had affected the Indian stock market during its peak. The Government can monitor such facts and warn or guide investors about the possibilities of the damage in the economy and provide better information about the scenario that may help them from falling in the trap of herding behaviour in the market and is possible and feasible because crises does not occour all of a sudden.

III. Up-Scaling Existing Investor Education (Training)

Individual investors are more prone to herding behaviour than the institutional investors and their inexperience in the market may induce herding behaviour and this can be avoided by providing adequate training.

IV. Mechanism to Provide Information at Affordable Cost

The investor's perception overweighed to suggest that information cost is another important reason for herding behaviour and the authorities should take necessary steps to provide the information at affordable cost or free of cost. Since the market showed herding tendency and if an unscrupilous group join with the herd, it may increase the intensity of herding and this may led to catastrophy in the market.

V. Inclusion of Behavioural Factor in Assessing Risk

Inclusion of behavioural variable in the model like CAPM may improve the predictability of security return and the predictability of the models.

6.4. Scope for Future Studies

The behavioural finance explicates the psychological and cognitive aspects of human behaviour, which is extremely valuable in explaining many of the anomalies existed in the market and for decision making. The research on herding behaviour can be extended in the following ways:

1) The intensity of individual herding and Institutional herding are different and such an analysis may provide better understanding about the herding behaviour in Indian stock market, since institutional investors are one of the major investors in Indian stock market and they are considered to be better informed investors than the individual investors.

2) One can check the bi-directional relationship between volatility and herding and the effect of herding driven volatility in the market and the same effect on volume can also be checked.

3) The role of Herding and Contagion effect on other market such as foreign exchange & Bullion market can be studied.

4) Herding is more prevalent in short term and is able to catch up with intraday data and thereby one can test the intraday level herding behaviour of investors in the market.

5) Study can be conducted to examine the Determinants of Herding Behaviour in Indian Stock Market.

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7) http://www.sebi.gov.in
8) http://www.wikipedia.org
9) http://www.youtube.com/watch?v=chSHqogx2CI

APPENDICES

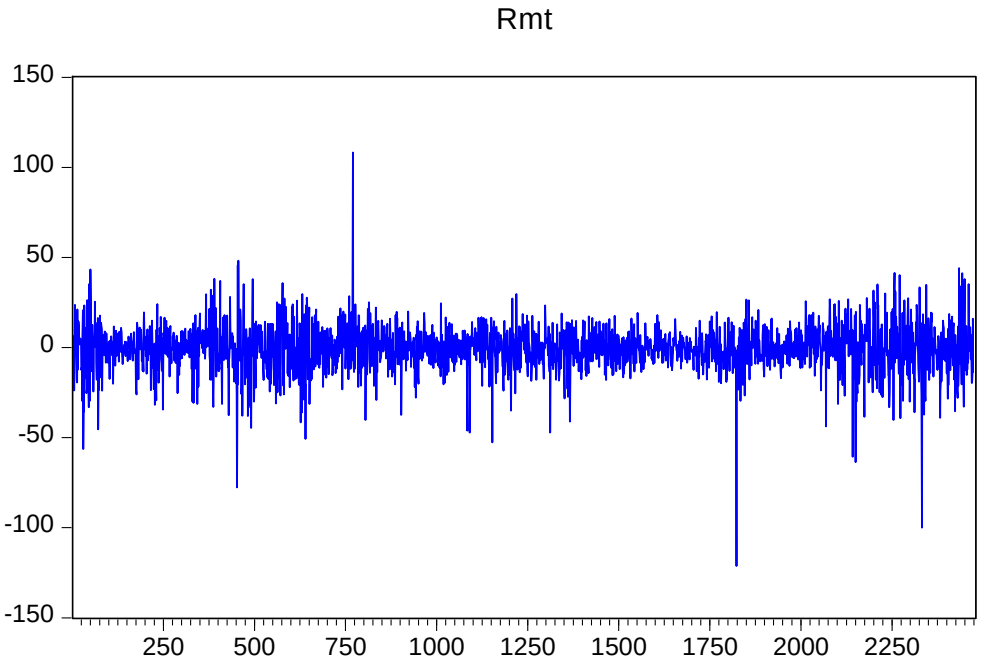
Table.1. Companies considered for the study

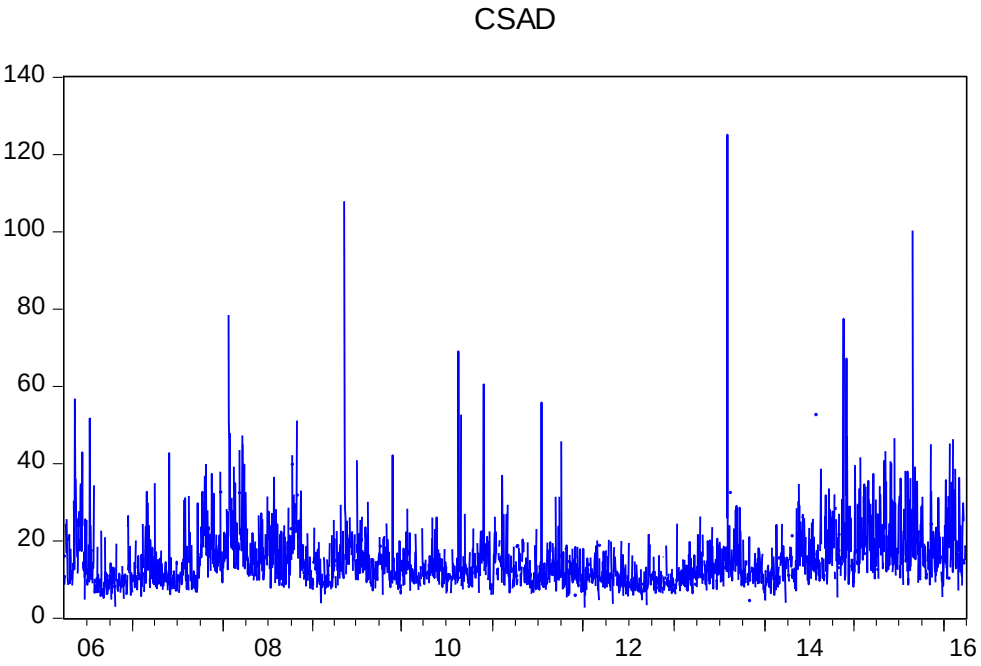
Company Name	Industry	Symbol	ISIN Code
ACC Ltd.	CEMENT & CEMENT PRODUCTS	ACC	INE012A01025
Ambuja cement Ltd.	CEMENT & CEMENT PRODUCTS	AMBUJACEM	INE079A01024
Asian paints Ltd.	CONSUMER GOODS	ASIANPAINT	INE021A01026
Axis Bank Ltd.	FINANCIAL SERVICES	AXISBANK	INE238A01034
Bajaj Auto Ltd.	AUTOMOBILE	BAJAJ-AUTO	INE917I01010
Bank of Baroda	FINANCIAL SERVICES	BANKBARODA	INE028A01039
Bharat Heavy Electricals Ltd.	INDUSTRIAL MANUFACTURING	BHEL	INE257A01026
Bharat Petroleum Corporation Ltd.	ENERGY	BPCL	INE029A01011
Bharti Airtel Ltd.	TELECOM	BHARTIARTL	INE397D01024
Cipla Ltd.	PHARMA	CIPLA	INE059A01026
Coal India Ltd.	METALS	COALINDIA	INE522F01014
Dr. Reddy's Laboratories Ltd.	PHARMA	DRREDDY	INE089A01023
Eicher Motors Ltd.	AUTOMOBILE	EICHERMOT	INE066A01013
GAIL (India) Ltd.	ENERGY	GAIL	INE129A01019
Grasim Industries Ltd.	CEMENT & CEMENT PRODUCTS	GRASIM	INE047A01013
HCL Technologies Ltd.	IT	HCLTECH	INE860A01027
HousingDevelopment Finance Corporation Ltd.	FINANCIAL SERVICES	HDFC	INE001A01036
HDFC Bank Ltd.	FINANCIAL SERVICES	HDFCBANK	INE040A01026
Hero MotoCorp Ltd.	AUTOMOBILE	HEROMOTOCO	INE158A01026
Hindalco Industries Ltd.	METALS	HINDALCO	INE038A01020

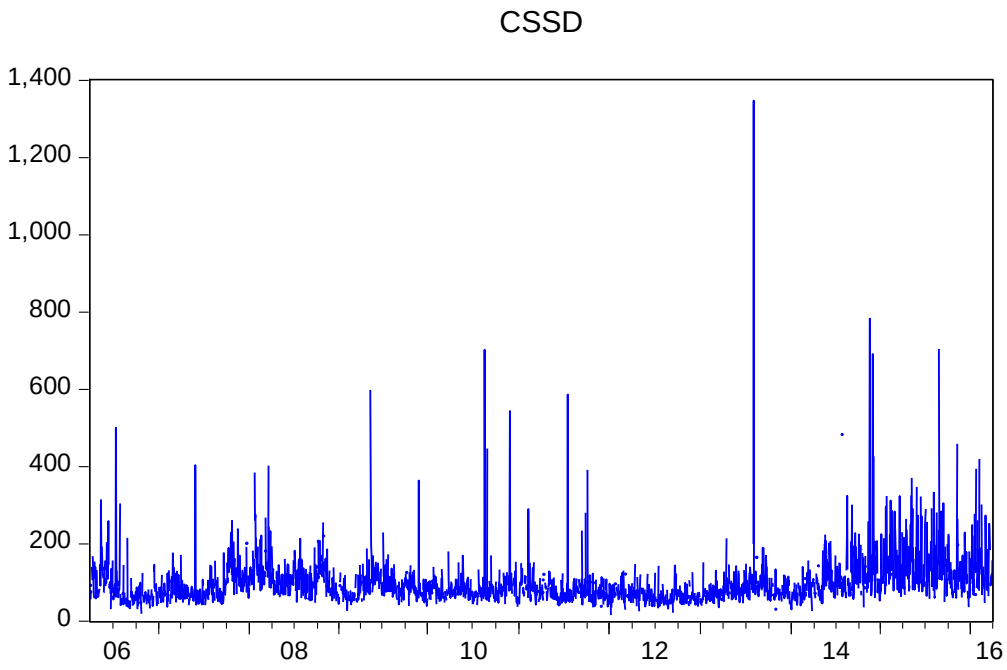
Hindustan Unilever Ltd.	CONSUMER GOODS	HINDUNILVR	INE030A01027
ICICI Bank Ltd.	FINANCIAL SERVICES	ICICIBANK	INE090A01021
IndusInd Bank Ltd.	FINANCIAL SERVICES	INDUSINDBK	INE095A01012
Infosys Ltd.	IT	INFY	INE009A01021
I T C Ltd.	CONSUMER GOODS	ITC	INE154A01025
Kotak Mahindra Bank Ltd.	FINANCIAL SERVICES	KOTAKBANK	INE237A01028
Lupin Ltd.	PHARMA	LUPIN	INE326A01037
Mahindra & Mahindra Ltd.	AUTOMOBILE	M&M	INE101A01026
Maruti Suzuki India Ltd.	AUTOMOBILE	MARUTI	INE585B01010
NTPC Ltd.	ENERGY	NTPC	INE733E01010
Oil & Natural Gas Corporation Ltd.	ENERGY	ONGC	INE213A01029
Power Grid Corporation of India Ltd.	ENERGY	POWERGRID	INE752E01010
Reliance Industries Ltd.	ENERGY	RELIANCE	INE002A01018
State Bank of India	FINANCIAL SERVICES	SBIN	INE062A01020
Sun Pharmaceutical Industries Ltd.	PHARMA	SUNPHARMA	INE044A01036
Tata Motors Ltd DVR	AUTOMOBILE	TATAMTRDVR	IN9155A01020
Tata Power Co. Ltd.	ENERGY	TATAPOWER	INE245A01021
Tata Steel Ltd.	METALS	TATASTEEL	INE081A01012
Tata Consultancy Services Ltd.	IT	TCS	INE467B01029
UltraTech Cement Ltd.	CEMENT & CEMENT PRODUCTS	ULTRACEMCO	INE481G01011
Wipro Ltd.	IT	WIPRO	INE075A01022
Yes Bank Ltd.	FINANCIAL SERVICES	YESBANK	INE528G01019

Source: Compiled using NSE inclusion/ exclusion file.

Fig:1 Line Graph of Different Variables Used in this Study






CSSD
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