An examination of herding behavior in Pakistani, Indian, and Chinese stock market

By

Farhana Raheem

MM133004

MASTER OF SCIENCE IN MANAGEMENT SCIENCES

(FINANCE)

DEPARTMENT OF MANAGEMENT SCIENCES

CAPITAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

ISLAMABAD

2017

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Farhana Raheem

MM133004

A Research Thesis submitted to the Department of Management Sciences,
Capital University of Science & Technology, Islamabad
In partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT SCIENCES

(FINANCE)

DEPARTMENT OF MANAGEMENT SCIENCES

CAPITAL UNIVERSITY OF SCIENCE & TECHNOLOGY

ISLAMABAD

October, 2017

CAPITAL UNIVERSITY OF SCIENCE & TECHNOLOGY ISLAMABAD

Islamabad Expressway, Kahuta Road, Zone-V, Islamabad

Phone: +92 51 111 555 666, Fax: 92 51 4486705

Email: info@cust.edu.pk, Website: http"//www.cust.edu.pk

CERTIFICATE OF APPROVAL

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By

Farhana Raheem

MM133004

THESIS EXAMINING COMMITTEE

S No	Examiner	Name	Organization
(a)	External Examiner	Miss. Zuee Javaira	FUU, Islamabad
(b)	Internal Examiner	Dr. Arshad Hassan	CUST, Islamabad
(c)	Supervisor	Dr. Ahmad Fraz	CUST, Islamabad

_____

Dr. Ahmad Fraz

Thesis Supervisor

October, 2017

_____ _____

Dr. Sajid Bashir

Head

Department of Management Sciences

Dated: October, 2017

Dr. Arshad Hassan

Dean

Faculty of Management and Social Sciences

Dated : October, 2017

Certificate

This is to certify that Ms. Farhana Raheem has incorporated all observations, suggestions and comments made by the external evaluators as well as the internal and thesis supervisor. The title of her thesis is: **An examination of herding behavior in Pakistani, Indian, and Chinese stock market.**

Forwarded for necessary action

_____

Dr. Ahmad Fraz

(Thesis Supervisor)

DEDICATION

This thesis is dedicated to my parents for their enduring patience, encouragement, love and support and for putting me through the best education possible. I appreciate their sacrifices as I wouldn't have been able to get to this stage without them.

I thank my brothers for the interest they showed in my studies and the motivation they gave me during those trying times when I had doubts about my abilities. Their confidence and faith in me helped me in achieving my goals.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful, all praise to Allah for His blessings in completion of this task despite my weaknesses and limitations. I would like to express my sincere thanks to a number of people who have made the completion of this thesis possible. I am extremely grateful to all of them.

I would like to thank my thesis supervisor Dr. Ahmad Fraz, who has provided me continuous inspiration, assistance, support and motivation to complete this study. His dedication to financial research and hard work will continue to be a source of motivation and guidance for me long after the completion of this degree.

I express my gratitude to Dr. Arshad Hassan for insightful suggestions that have improved many aspects of this thesis significantly and valuable guidance which he has provided me throughout my degree.

I am also grateful to Mr. Maisam Ali Bangash and Mr. Imran Yousaf for helping and providing invaluable suggestions regarding research methodology and data analysis.

Finally, I would also like to thank my family and friends. Their persistent encouragement and support has made the difference in helping me persevere towards the completion of this journey.

All errors in this thesis are my sole responsibility.

Farhana Raheem

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Abstract

This study investigates the existence of herding behavior in Pakistani, Chinese and Indian stock exchange, using daily, weekly and monthly returns of eighty companies according to market capitalization during the time frame of 2006 to 2016. A quantitative approach is used to detect herding behavior. Cross sectional standard deviation (CSSD) and cross sectional absolute deviation (CSAD) are two models that are proposed by Christie & Huang (1995) and Chang et al. (2000). These two models are generally used to measure the existence of herding behavior among individual trading stocks. The factual tests indicate that the dispersion of equity return tend to increase during the periods of extreme price movements rather than decreasing and hence depicting the absence of any herding behavior. In Pakistani and Chinese market herding is evident during the crash period, whereas in Indian market no evidence of herding is found during the crash period. The Pakistani, Chinese and Indian equity markets show the unvarying results as suggested by Christie and Huang (1995). The findings are supporting rational asset pricing model and indicate a higher degree of dispersion of equity related returns i.e. no herding during extreme high and low price movement days. Overall the markets are irrational and inefficient.

Keywords: Herding behavior, Pakistani, Indian and Chinese stock market, Cross sectional standard deviation, Cross sectional absolute deviation, Market returns, and Asymmetric behavior.

Chapter 01

1. Introduction

Herding behavior in financial markets is described as how people are influenced by their peers to adopt certain behaviors like actions and forecasts other principles and beliefs. Such behavior a tendency between them results in investors to form a group and asset prices to be correlated (Gebka & Wohar 2013).This behavior appears when the number of investors has different information and this information cascade leads them to certain decisions.

It has proved many times that people follow others when they make certain decisions. The behavior is known as herding behavior. Herding behavior has led to financial market stability and its efficiency. Thus the psychological definition that has been developed for herding behaviour and has been referred as a phenomenon where a group of people follow the decisions of others, though the decision may be incorrect. It means the group decisions are not taken as rational decisions (Christie & Huang, 1995; Rook, 2006). It is normal that people go after what others do and hence ignore their own judgements and experiences. This is the reason that herding has an impact on one's intuition and decision making process and this behavior helps to understand the violation of Efficient Market Hypothesis (EMH). This theory actually explains the rationality of decisions (Chang, Cheng, & Khorana, 2000).

On the other hand the herding behavior of investors contradicts the theory of EMH that states that the investors imagine the expected prices of stock in the same manner because of the reason that they all own the same kind of information from an efficient market. This situation results in the fair value of securities that is only possible due to perfect information which is available in active market (Fama, 1970). Contrary to the efficient market hypothesis, herding behavior suggests that this does not happen every time and some investors originate share price simply by scrutinizing and following other investor's behaviors despite the fact that all participants are not well versed. So the herding behavior will imbalance the market and leads to imprecise values of securities because of the involvement of irrational decisions (Demirer & Kutan, 2006, Hott, 2009). Therefore, EMH cannot explain the presence of herding behavior in a stock market.

1.1 Overview of Pakistani, Chinese, and Indian stock markets

This study demonstrates the behavior of Pakistani, Chinese and Indian stock market players showing their tendency towards herding behavior.

Describing features and structure of Pakistani stock market, it is estimated that after inauguration in 1970, 85% of turnover is observed at KSE in 1997. Similarly 14% turnover is observed at LSE and around 1% is observed at ISE. The listed companies are 560 as on May 28, 2016, and thrice of markets KSE, LSE, and ISE have merged into a single market PSE on January 11, 2016. The total market capitalization is 98 billion dollars.

Two stock exchanges: Shanghai stock exchange founded in 1990 and Shenzhen stock exchange are operating in china. Market capitalization of Shenzhen is 3.5 trillion US dollars. Shenzhen is not entirely open for foreign investors. As a developing market Chinese economy is growing as a very fast pace. It allows its stock market to delivers strong returns. In 2000 Dow Jones China index had raised 49%. Such gain level was achieved previously in 1933. So, higher return is associated with higher volatility and China stock market also shows high volatility.

Bombay stock exchange and national stock exchange are two primary exchanges in India. NSE as around 1500 shares listed with the total market capitalization of around Rs.921500 million. BSE has 6000 stocks listed and has a market capitalization of around Rs.968000 million. BSE (BSE Sensex) is the older and more widely followed index.

1.2 Theoretical Background

1.2.1 Efficient Market Hypothesis (EMH) Theory

There are two views regarding stock market behavior one is traditional view and the other is Behavioral Finance view; that control investment decisions in stock exchange market. Still the theory of EMH is known as a keystone in investment decisions. In an efficient market, stock prices reveal all relevant available information and in long run the market participants cannot earn abnormal profit. Market efficiency is explained at three levels where each level is explained on the basis of information available. These three forms are named as weak form, semi-strong and strong form of efficiency. In weak form securities are priced on the basis of past or historical information. This

historical information is not relevant so it does not affect prices. Semi-Strong form explains the prices of securities include public information. The third one strong form efficiency reveals that the security prices reflect both public and private information. It includes the consideration of fundamental and technical analysis to obtain the best near accurate pricing. Efficient Market Hypothesis depends on certain factors like rational behavior of investors and Arbitrage. The rational decision requires being rational but still if some investors behave irrationally it would not affect stock prices. The reason is that investors take decisions randomly and this random behavior will cancel the effect on stock exchange pricing. Arbitrage, a result of market inefficiencies will also invalidate the irrational behavior against prices. There are certain studies that have been conducted sixties and seventies of penultimate century also support Efficient Market Hypothesis theoretically and experimentally. Behavioral finance challenges EMH in the context of participants of the market. Many other academics emergence in the context of academic finance in 1980's e.g. Thaler (1981) and Shiller (1981). The field of behavior finance is actually the combination of psychology and neoclassical economics.

In 80's, some experimental results reveal the inefficiency of EMH by showing the securities having higher price to earnings ratio (P/E) ratio are priced above the fair value and vice versa. Earnings of securities also support this inefficiency. An anomaly in the behavior of earnings of some securities, contradicting EMH then opens up a new room of discussion and gave rise to behavioral finance. This is the broader term including both psychology and sociology. Behavioral finance is not in line with efficient market hypothesis and it opposes EMH.

1.3Problem Statement

The herding behavior of investors greatly affects the investment decision. There are some investors who follow others when making financial decisions like investing in securities. Such poor performance of the noise traders' activities is resulted in market as they do not take rational decisions. This irrational behavior should be investigated. So that rational investors can lead the market.

1.4Research Questions

This study has following research questions:

1. Does Pakistani, Indian and Chinese stock market follow rational behavior or herding behavior?
2. Whether herding behavior impact the stock returns under different market conditions?

1.5Research Objectives

This study has following research Objectives:

1. To examine the herding behavior of Pakistani, Chinese and Indian stock market players.
2. To investigate the presence of herding behavior on stock returns when there are extreme market movements.
3. To check the presence of herding during year specific effect i.e. stock market crash.

1.6Significance of the Study

Efficient market hypothesis predicts fair market value of securities but number of anomalies which are company specific, behavior specific or time specific are identified. Herding is one of these anomalies. Herding contradicts efficient market hypothesis. Herding is considered to cause market inefficiency. When market participants will have inefficient information they will trade based on other signals. As a result herding may destabilize markets as prices are driven away from fair market value. And prices based on asset pricing model will result in incorrect valuation (Javaira & Hassan, 2015).

Demier et al., (2010) research study reflects importance of herding in terms of portfolio diversification. When investors follow each other even more securities are required to achieve the required level of diversification as compared to securities needed for diversification when the market is efficient. So, for investors it is better to invest in equity markets where there is no herding.

Theoretically it is the comparative empirical study that contributes to the body of knowledge. It helps investors and researchers in understanding of the phenomena and

search for implications of herding on different markets. Overall it will help in understanding of market functioning and served academic and practitioners to accurately evaluate and predict stock returns.

1.7 Plan of the study

The purpose of the study is to examine the herding behaviour in Pakistani, Indian, and Chinese stock market. This study is organized into following five chapters.

Chapter 1: In this chapter introduction, theoretical background, research questions, problem statement, and significance of the study are discussed.

Chapter 2: Literature review is narrated in this chapter.

Chapter 3: Data and methodology is discussed in this chapter.

Chapter 4: It comprises of results and findings.

Chapter 5: Conclusion, key findings, policy implications, future research and limitation are discussed.

Chapter 02

2. Literature review

Empirical investigation, regarding definition of herding, is in general ambiguous. So the grounds, influences and measurements surrounding herding need to be explained. The current literature is organized regarding different themes as namely, intentional and spurious herding, rational and irrational herding, herding and financial distress, herding in relation with institutions and funds and other various studies that are quite relevant to the current study. They are elaborated in the following discussion.

2.1 Intentional vs. spurious herding

Financial world is very complicated where defining herding is not an easy task. People try to differentiate herding from normal behavior in the market. Herding can be of different sorts as spurious and intentional herding (Devenow & Welch, 1996). They also recognized different forms of concentrations while studying the results of different research studies in financial literature regarding herding behavior. They recognized different kinds of incentives like payoff externalities, bank runs, liquidity in market and also information about acquisition. Keeping in view the discussion of herding Kremer & Nautz (2013) recognized three kinds of herding the unintentional, intentional and spurious herding. According to them, the first one is basically fundamental herding that has been driven because almost all institutions receive same private information and therefore examine the same factors. This leads them to reach a similar conclusion for each stock. Intentional herding has been define to be more sediment-driven as other market participants are being copied consciously by investors, that results in trading of the same stocks regardless of any kind of information that reveals about them or previous beliefs. This is the reason asset prices do not reflect accurate and fundamental information resulting in serious exacerbation of volatility and destabilisation of markets. So it can be said that herding because of its bad consequences have the potential to create or at least contribute towards the failure of financial markets. Particularly herding through expectations could be examining the significance of externalities from which the process of decision making is affected (Chen, Wu & Huang, 2017). Unintentional herding may exist in the market

when present or for say new investors follow other investors' investment decision whether or not similar information is followed. Intentional herding is different in a way that investors are consciously copying others and suppressing their own decision making power despite the fact that they may have sufficient information (Caparrelli, D 'Arcangelis and Cassuto, 2004).

Spurious herding as described by Bikhchandani and Sharma (2001) is an effective outcome of groups taking similar decisions, when possessing same information and the investors face the problem of decision making related to cognition. Actually this kind of herding is known to be caused by fundamental factors. For example, if an investor makes portfolio such that it contains a smaller percentage of stocks that are effected by increase or decrease in interest rates which ultimately results in loss of attraction towards stocks. This is actually not herding, but a reaction to publically known information.

In addition, other authors explained that in intentional herding investors show different behavior. They copy behavior of other investors. From literature it is also known that spurious herding results in efficient decision-making usually, but this is not the case with intentional herding. It is of high importance to distinguish between the two classes of herding, but studies have revealed that this is empirically difficult. So, herding helps us to understand this concept more thoroughly and to distinguish between intentional and spurious herding, where the latter one is not contributing towards market inefficiency and does not affect stock prices (Bikhchandani & Sharma, 2001).

Herding can also be explained in terms of rational vs. irrational herding. Describing the kinds of herding Christie and Huang (1995) defined two important forms of herding behavior. One is rational the other is Irrational. They stated that irrational herding arises when people become depended on others and quit reliance on their own information even when they are certain about forecasted outcomes. Similarly, Chang et al. (2000) has defined herding behavior to be irrational where previous beliefs are ignored and others are blindly copied. In psychological perspective Prast (2000) found that cognitive psychology has its place while explaining irrational herding. The author, in herding behavior, found cognitive dissonance. He found that psychological factors have their effect on financial decisions when gathering information and interpreting it. Similarly, it is explained that Cognitive dissonance is a situation where

a person is confronted with new information that contradicts his existing beliefs, but chooses to disregard new beliefs and going with his own in order to vanish the feeling of regret over misleading beliefs.

Besides, it can be evident under different circumstances as Christie & Huang (1995) believed that irrational behavior is observed during stress period in financial markets. They believed that investors are not in the mood of taking any risk and therefore they follow others blindly. It's the anxiety which leads to a situation where one loses his/her ability to judge things in proper way and hence going with the market consensus.

However, Devenow and Welch, (1996) defined rational herding as a behavior of incompetent managers who follow the footsteps of their seniors, thereby ignoring their own beliefs and knowledge and assume that others are better informed and their decisions are more precise. They assume that relying on others make the investors feel that they can maintain their reputation in the financial market. Rational perspective implies that people, especially financial managers copy others, this is the prime reason that they secure their own interest and reputation.

In addition to the above reasoning, it is explained that herding as a strategy would be seen differently. An investors' behavior that is neither rational nor fully irrational is said to be momentum-investment strategy and that is based on positive feedback training. This explains the behavior of investors to different classes of stocks. These classes are good and popper forming stocks. The investors are inclined towards buying good performing stocks while selling poor performing stocks. But this kind of strategy is related to herding in financial markets by Nofsinger and Sias (1999), in a way that both institutional and individual investors show the same trend of trading over a certain period of time by moving in the same direction. So, we can say that this approach may be in between the boundaries of rational and irrational behavior, as this is partly and wilfully adopted to benefit from this strategy showing rationality. Contrarily, it also refers to noise traders or stock traders who take investment decisions irrationally and irregularly.

It is also evident that herding in whatever form can cause adverse consequences in the financial markets. According to De Long, Schleifer, Summers & Waldman, (1990), the presence of these two herding can cause severe price movements in stock markets, leading to volatility, even if all traders behave rationally. Hence, it could be said that

irrational herding originate because of same psychological behaviour of investors, while rational behavior is the intended one resulting from informational cascades. In between these two, positive feedback training is found somewhere.

In contrast, Chang et. al., (2000) believed that the herding is a normal activity which only outbursts/reaches to extremes during the periods of upward and downward volatility. The authors, Nofsinger & Sias's (1999), finally tend to analyze the difference between rational and irrational herding. According to them, financial investors involve in the same behavior (herding behavior) because they want to use positive feedback trading (PFT).

In addition to these understandings evaluation of herding behavior also keep us informed that half investors' decisions influence the prices in the market. This includes rational or irrational approach. Although there is a difficulty in investigating these psychological processes, this study is still useful as it provides us with further understanding into the analysis of herding behavior and provides the opportunity for future investigation.

2.2 Behavioral biases

Behavioural biases which are abnormalities in behavior also contribute to herding. Prechter (2001) argued that there is a system in human brain that is known as limbic system works faster than the part known as neocortex in emotional situations. He also claimed that herding behavior is inbuilt in humans and supporting his statement by saying "avoid rejection by revealing your sameness". He believed that it also causes adverse feelings when one thinks to act against the opinion of others.

Herding is associated with other biases in one way or the other. One aspect is highlighted by Cipriani & Guarino, (2005) who found that herding behavior seldom occurs. They further explained that in real markets, herding is observed because of the participants trying to protect their reputation. They also identified that the participants didn't follow private information and restrained from buying and selling which ultimately leads to the inefficiency of information that reflected in prices of stock in markets.

Similarly, Yahyazadefar et al., (1985) investigated how herding behavior is linked with regret aversion. They also included disposition effect, conservatism and cognitive factor in consideration for relation. Disposition effect is defined as the

natural response of investors to selling objects in profits rather than losses, meanwhile avoiding tax benefits of claiming losses against previously earned or future gains. This behavior was identified by Shefrin and Statman (1985). Yahyazaderfar et al., (1985) defined other behavioral responses convoluted with regret aversion. Conservation is a type of behavioral model where a person follows the old traditional beliefs against new evidences. Conservatism is interlinked with omission bias. Omission bias is basically an alleged type of cognitive bias. It is an approach where people don't regret their omissions however productive they may be and rather talking about their adverse effects that if it could prove wrong.

2.3 Herding and financial distress

In this part of literature herding is explained in relation with financial distress. It is evaluated that herding and the crises in the financial markets are linked. The market movements' i.e. increase and decrease of prices can be caused by herding. Different research studies are aimed at investigating the herding in association with crises and some are made part of this literature.

Hwang & Salmon (2004) claimed that herding takes place before crisis and during crisis there is a flight of fundamentals. They took South Korean and US markets under observation and concluded that herding shows significant movements towards the market and is persistent with given market conditions. This can be expressed in terms volatility of returns and the level of average return. Study also shows that macroeconomic factors do not describe herding behavior. Similarly, herding was studied in US market for value. There are some studies whose results are matched with their previous work as presented by Hwang & Salmon (2007) which is concurrent with study conducted in2001 and 2004 in UK, South Korea and US.

While studying herding behavior in Southern European countries, using data of individual stocks, Economou et al. (2011) found significant evidences of herding in different markets like Greece and Italy. This study extended by Mobarek et al. (2014) where the author also replicated the research methodology used by Chiang & Zheng (2010). They focused on herding during worse market conditions known as crises. The study included 11 countries in Europe where the authors found that herding is shown during financial crises. But this herding behavior is more prominent in

continental countries. The study also concluded that Germany influences other markets by contributing towards their herding activity.

In other studies different countries are targeted to identify herding as Hwang & Salmon (2001) conducted study to identify herding in US, South Korean and UK markets. They identified that Asian and Russian crises in1997 and 1998 casted high effects on herding towards the market returns in the countries considered for study. They explained that this was contrary to believe that herding exists in markets during stress. They also found that herding exists when the market is quiet. When the crises are noticeable the herding relation with market returns becomes much weaker that means that herding disappears. It is also evident that during crises value of shares plays significant role as compared to growth and size. The significance of value of shares is associated with herding objective. In addition, they also explained that size is more important than other two variables i.e. value and growth. It can also be inferred from their study that advanced markets, like UK and US, show less herding than emerging markets, like South Korea.

Explaining in perspective of inconsistency and asymmetry in the market Chang et al., (2000) identified that herding behavior is inconsistent and asymmetric in South Korean market. Interestingly, they noticed that herding was more widespread during financial distress. They further explained this point in connection with directional asymmetry. Furthermore, they profess that all stock markets have a consistent response to negative macroeconomic news, but on the other hand small stock exchange markets show reaction that is slow to positive macroeconomics news, as reported by McQueen, Pinegar and Thorley (1996).

Further in literature, Demire et al., (2010) suggested that there are more chances of herding behavior to occur during extreme market conditions, as investors are more likely to be triggered in stress to go after the market consensus. So, it can be concluded that there would be abnormal returns of market over a specific period of time. But these market returns would be extreme market returns. Lao and Singh (2010) conducted an experimental study to find the relationship between extreme market returns and abnormal market returns for Chinese and Indian markets by comparing the evidence of herd behavior during normal and extreme market conditions. By extreme market conditions we mean upward or downward market conditions. They found that herding is evident when market is in stress. They

supported this point with respect to some behavior which is irrational behaviours of individual investors. These investors are inexperienced who are misled by information delivered by media. Additionally, there are also the evidences of extreme market returns during the period of crisis. This point opens the new doors of discussion. This discussion includes the investigation into finding herding behavior during financial crises. Chiang and Zheng (2010), while conducting the studies on global market, professed that herding is triggered in crisis in the country of its origin and slowly and contagiously it affects nearby countries. This relationship can be explained by the tendency of human psychology to go for conformity and security during the times of uncertainty.

Christie and Huang (1995) suggested an additional method that measures herding. The model is based on the divination of CAPM theory of rationality. Constant sensitivity and dispersion are taken to calculate the stock values of specific market in this model. Market condition is ignored here. This type of herding is observable in the market during financial distress to make sure consensus of market under uncertainty. Ultimately, the returns of individual assets are moving with return of the market. But this is in contradiction to the sensitivity of price of individual security predicted, which was proposed by rationality model (rational asset pricing model). In this approach it has been determined that stock returns are aggregated in the period with high dispersion that ultimately needs to low return variation between securities and the market. This particular approach is called Market-wide approach. In this approach investors showing herding behavior towards market return are investigated. Chinese stock market was studied during market stress by Demirer & Kutan (2005).They used firm level data and sector level data, but found no herding.

Some studies are found in literature that shows the contagious effect of herding among the markets. It can be transferred from one market in to another. It means that herding in one market can affect other markets too. Talking about contagion effect Chiang et al. (2007) argued that financial crises in late 1990s in East Asia effect markets in that region. The effect is contagion between the markets on the other hand other researchers have revealed contradictory results. Forbes & Rigobon (2002) came up with such result that there is no contagion effect. In fact that was only interdependence leading that crisis to surrounding interdependent markets. Similar results were found for other prices in different countries. These crises include

Mexican peso 1994 and black Monday crash that was happened in 1987. Besides authors Corsetti et al. (2005) identified that the crises affect interdependent markets. They found that crises in Hong Kong that had happened in 1997 and it had far reaching affects not only in the Hong Kong markets but also in French stock market. Chiang & Zheng (2010) struggled to present results such that to identify herding in US markets. They also put efforts to identify if different markets show herding in relation with each other in US. They further explained that many investors copy others for their work in domestic as well as in US market. Some observations show that investors in Latin America show herding with respect to US market; however this kind of behavior is not shown in domestic market.

Herding is believed to be not only happening within a particular stock market. Some stock markets seem to herd together and therefore various crises arise and this is an interest point for contagious herding. Billio and Caporin (2012) identified evidence of contagious herding between American and Asian stock markets. The root cause of herding is international investors. These investors are found to be between emerging and developed markets. This kind of situation was found by Boyer at al., (2006). They also claimed that high herding is observed during periods of high volatility, spreading through institutional investors. Contagious effect can be studied in more detail using data of more recent financial crisis. Academic financial literature study contains evidences of herding in different stock markets. This research study was conducted with different intentions other than noticing contagion effects of the markets

2.4 Herding in relation with Institutions and Funds

Herding can be evident in either individual investors or institutions. It may be expressed in securities as well as different kinds of funds. In this part herding in relation to institutions and funds is evaluated.

First of the two institutions are explained as we further continue the discussion about both. For the sick of high performance managers adopt herding as Sharfstein and Stein (1990) found in their studies that herding is more pervasive in managers of financial institutions because their performance is compared to other managers having high reputation. They, therefore copy the decisions of bench markers in their field so that the liability of “sharing the blame” is distributed collectively amongst all. Devenow and Welch (1996) reached the same conclusion that managers investing in

financial markets herd intentionally to avoid bad reputation and financial interests that have been obtained from their firms. Moreover, agents (as they are investors too) keep information used by others to outperform in the market. This concept is further explained by authors Bikhchandani and Sharma (2000) who stated that herding is instigated by the emergence of the concept that is known as of information learning and information cascades. This is based on the concept that agents reserve useful information as they have observed previous agents' decisions so deeply that they forgo their own capabilities, beliefs and information. General investors are less informed then those of institutional investors during high volatility periods herding has been noticed (Chen, Wu & Huang, 2017).

Herding behavior is sometimes associated with market inefficiencies; weak market regulations, change in laws or other processes by government and also the institution such as central bank, and less educated investors and the low disclosure requirements of information by listed firms. Actually, these inefficiencies are considered the part of developing markets. So, it is believed by many authors that herding is more common in developing markets. Chang et al., (2000) demonstrated that herding exists in South Korean and Taiwanese markets, which are emerging markets and possess incomplete information disclosures. They believed that there is a much more importance of macroeconomics with respect to the investor decision-making, which in turn make them more prone to the herding behavior.

Most of the institutional investors forecast about the market earnings. Earnings forecasts play a fundamental role to share markets. Here it is analysed that those who forecasts may also be subject to herd, these analysts are like corporate executives (Zwiebel, 1995 & Scharfstein & Stein, 1990). Moreover, in another study conducted by Trueman (1994) revealed that reputational herding exists. He explained that the analysts had private information although they didn't use it for forecast and they involved herding. On the other hand the study conducted by Bernhardt et al. (2006) explained results opposite to that of Trueman (1994). He explained that analysts use their own information about the market to forecast instead going for herding. He believed that earlier results about herding were just because of the use of poor methodology that was used. Those methodologies could show clustering to be a form of herding. These kinds of results were identified by Chen & Jiang (2006). In their study they revealed that most of the analysts rely on their own private information that

would be biased. When giving more positive forecasts, overweighing is more persistent when they rely on their own information than depending on consensus. Overweighting is defined as to give overshooting forecasts. Little overweighting is also witnessed in case of pessimistic forecasts but usually underweighting is related to pessimistic forecasts. So, it is said that the factor of incentives is considered to contribute this response rather than behavioral anomalies (Chan & Jiang, 2006). Similarly, according to Navjoks et al. (2009), analysts in Germany do not follow other that means they don't involve in herding and they give more importance to the information they have. And also there are some analysts in the firm who don't involve herding and contribute to anti herding. It is also found that the analysts do revise their forecast two third of the time from top to bottom. In the study of Navjoks et al. (2009) it was identified their small caps showed lower anti-herding than large firms, Welch (2000).

Nonetheless, According to Kremer and Nautz (2011) it is evident that low herding is shown by investors' particularly institutional investors. This herding is noticed in German Stock market. Moreover, they support their study with the measure developed by Richard Rias (2004). This is a dynamic herding model that captures herding. Further in the study they identified that institutional trade has correlation with the passage of time, although this is not because of herding. However, the reason is that these institutions follow their own unique trading terms so as a result it was not found that herding exists during market stress. This is also valid for small cap stocks. Nofsinger and Sias (1999) found that institutional investors behave differently from individual investors. Institutional investors show positive momentum in intra-year while individual investors do not. Pound & Shiller (1989) identified that institutional investors' decisions are overwhelmed by word of mouth. Contagion of interest is found outside to financial markets. Therefore, having markets with investors immune to this type of behavior is above faith.

Contrary to the study of Lindhe (2012) another research study (Ohlson, 2010) identified herding in Swedish stock market in the year of 2000. In the study it is claimed that institutional investors are more likely involved in herding behavior. It is also examined that when high activities are prevailed in the market the large cap stocks show herding. This means that institutional investors cause herding, since they concentrate on large caps, thereby ignoring small caps.

Herding behavior may not be seen by institutional investors due to imperfect information, even though it might be happened as well, on the other hand primarily for the long term because of the reputational concerns and structures of compensation (Bernhardt et al. 2006 ; Clarke and Subramanian, 2006).

Now the second part, that is, fund section is explained here. It is evident from multiple studies that mutual funds also show the same phenomena of herding. 77% of mutual funds act as momentum for investors to herd, as described by Grinblatte et al., (1995). They presented that these funds have the tendency to give better returns than others. They also found the weak evidence of herding during buy and sale of funds. A study was conducted by Lakonishok et al. (1992) where they have considered pension funds .they presented results containing evidences about herding also the results explained that the herding is shown by small cap stocks. In general, the investment containing pension funds as proved that inclusion of pension funds has briefly minimized stock (Thomas et al. 2014). In further study Wermers (1999) examined herding with twenty tears data by mutual funds managers. He identified higher level of herding in growth oriented funds and average level of herding in small stocks. But this herding is relevant to feedback herding that is positive. Still in the study we can found less evidence about window dressing (analysing), sell-side herding in mutual funds.

Extending the discussion further, analysis of herding behavior of investment funds in Chinese markets by Shi Donghui (2001) shows serious symptoms of herding by presenting that 75% of the funds are clustered in one portfolio. Tests conducted by Julio Lobao (2002) regarding mutual funds in Portugal of a period from 1998 to 2000 suggest strong evidence of herding shown by Portuguese mutual funds. It is identified that even stronger herding (4 to 5 times) was evident in institutional investors present in the mature markets. Herding was believed to affect sales and purchases of stocks. Stronger tendency to herd was found among medium-cap funds. Herding was less likely to occur among very small or very large funds, and among funds with fewer stocks. Furthermore, herding was believed to decrease with the performance of stock markets i.e. when the market is having good performance.

Other scholars used different methods to investigate the herding in funds. One such study conducted by Yuan and Chen (2003) using LSV method, as suggested by Lakonishok (1991) explained the pattern of herding of investment funds in Shanghai and Shenzhen stock markets and found strong evidence of herding among mutual

funds in stock markets of China. In another study different approach is used to examine herding. Last but not the least, Gleason et al. (2004) used intraday data that accounts for Exchange Traded Funds (ETFs). It is used for herding behavior of market participants. Results explained that herding was not common when the market movements were running in extreme. Similarly, he presented that the participants shows a weak asymmetric reaction to the news. As far as bad news is concerned they are absorbed quickly in markets. This is because it heralds herding in bearish conditions.

2.5 Various additional studies on herding

In this section various studies are included. These are selected either on the bases of model used or importance to the study under investigation. For instance, Christie & Huang (1995) tend to focus on CSSD (model) to observe the mean deviation of stock returns in the market. However, they did not find any indication of herding in American markets, while using this methodology. This method has been modified in further studies i.e. Chang et al. (2000). As it is focused on some international markets (emerging markets), and markets like these are considered in Asia and US. However, Chang et al. (2000) deviated from the model used by the two authors Christie & Huang (1995). They have used absolute deviation in their investigation although standard deviation was used before. This was done to compare return deviation in the relation to the return in the market. Size of difference was taken as base for comparison that was implied by rational asset pricing model (Klein 2013). After examining the relation between the two factors the absolute return deviation and absolute market return in South Korea and Taiwan, the herding was found in the market, but found the same results as concluded by Christie & Huang (1995) as to the US.

Similarly, a lot of research studies went into analysis of herding in different stock markets. They used measures like market return dispersion during periods when significant changes in stock prices were noticed in the markets (Christie & Huang, 1995; Chang et al., 2000; Tan et al., 2008, etc.).Some reasons were provided in the literature study by Christie and Huang (1995) they explained that during stress period, stock returns are more clustered. This clustering of stock returns indicates the correlated movement of stock prices. In turn this correlation is independent of their

fundamental attributes. So we can say that these stress periods are identified by the formation of herds where individual investors do not follow their own beliefs and copy belief of others in the market.

Further it is evident that in the presence of herding behavior by investors, volatility of returns known as cross-sectional dispersion is predicted to be low. Hwang and Salmon (2004) more recently, focussed on how factors are sensitive with cross-sectional variability. Their study was related to dispersion based measure of herding which included patterns foe assets in the stock market.

In addition to volatility, trading is also focused by researchers to investigate the herding. The study of Tan et al. (2008) investigated the irregular patterns in herding under different market conditions. These conditions are stated as levels of volatility and trading volume. Their study reveals that during market boom, herding is evident or alternatively, it can be stated that it is indicated by high trading volume and high volatility. The authors contended such inconsistent effects only in the A share of Shanghai stock exchange because it comprises of firms previously owned by state. It is believed by many investors that when the economy is growing the government intervene. So, most of the individual investors take investing decisions during this time and hence a high level of herding is observed. Deminer and Kuttan (2006) was conducted study to identify herding. They distinguished among Shanghai and Shenzhen stock exchanges (SSE, 2009; SZSE 2009), at sector level, and found no herding in Chinese markets. To identify herding in Shanghai and Shenzhen markets of A-Share markets. Chiang, Li, and Tan (2010) were used least squares method and they found herding in Asian market but did not between B share markets. So, it is concluded that herding behavior needs more discussion in Chinese markets.

Trading style also contributes to herding which in turn affects returns. Ulku and Weber (2012) had identified different trading styles while considering different investors. These include the individual investors and merchant in Korean Stock Exchange. The results presented also shows that individual investors are identified as a positive feedback trader despite that their trade show a strong negative correlation with market return. They also present some results such that merchant traders have the ability to forecast precisely. The forecast is significant over the next two market days. It also shows intraday negative feedback trading, possibly due to their role as liquidity suppliers. In Korean Stock Exchange, private funds are also positive feedback trader

(Ulku & Weber, 2012). In addition, Welch (1992) found how sequential sales cause cascades to form in terms of IPOs. It is explained that sales pattern is important to consider. The sales pattern has more effect on success of IPO than price. Issuers also show information cascades that are they are not free of the herding. Issuers' calculation can also reflect information cascades. The investors later follow the actions of early ones blindly and disregarding their own information.

It is well known that world is like a global village. Information acquired by one investor can easily be available to others via internet no matter wherever they are residing. It is argued that globalization is also a reason behind herding behavior. Despite acquiring information through costly means, investors do simply herd. Informational cascades are easy to approach in globalized world. Globalization tends to reduce the gains earned from fixed cost paid to gather and process country- specific data. So, the concept of globalization has been widened where optimal portfolio is copied by investors (Calvo & Mendoza, 2000).

In literature some studies are found that argue no herding exists in Chinese stock market. They have also focused the market conditions to illustrate the herding. They explained that investors in these markets show asymmetric reaction. But when the stock markets were not performing well herding was found as investors tended to follow each other. Further in the study they argued that the stock with low turnover in Chinese stock markets presents some different results. These kinds of stocks converge to the market returns much more as compared to other stocks (Fu& Linn, 2010). The author Lindhe (2012) argued that mix results were found presented in the study. She conducted study in Nordic stock markets to capture herding. This study was intended to know about the nature of herding under different conditions and in different markets. The conditions are such that when the market goes up and down in the countries like US and European. She found that there is a significant evidence of herding in Finland but the evidences do not support herding in other stock markets. Herding was noticed in Finland on the bases of rearranged data during 2001 and 2004. The data was rearranged to sub-periods as per calendar year. In the same the results presented herding around US market by Sweden and Finland markets. The Nordic countries did show herding similar to the European markets. Herding was studied in Indian Stock Market by Prosad et al. (2000). They found that in general, there was no herding, but there were evidences of herding on up market days, which might indicate

positive-feedback trading. Henker et al. (2006) tried to find out whether Australian stock market herd during intraday trading or not. But they did not find any sign of herding at any level. Tan et al. (2008) studied two kind of shares A-shares and B-shares in China. A-shares accounted for domestic investors while B-shares accounted for foreign investors in stock market. Clearly herding was identified in both kinds of shares while using intra-day data. Besides, some other contributing factors are also identified. These factors are positive market returns, high turnover (high trading volume) and finally high volatility. During extreme periods in crisis different markets in Europe show asymmetric herding as suggested by Keasey et al. (2014).

Furthermore, there are significant results which suggest that direction in which market moves, affect the patterns of herding behavior, thereby, referring to different market movements namely bull and bear markets. But, they are exposed to restrictions, as they are prevailed in markets with some specific characteristics. Lao and Sing (2010) found that in Chinese market, herding is greater when there is a down fall in market. This is in contrast to results found in the market of Indian. In the Indian stock market herding was evident when the markets were rising. Therefore, their study supports the conclusions drawn by Chinag et al. (2007).They profess that in Asian markets herding market is totally different that is asymmetric when the market returns move either up or down.

Still some authors targeted different industries and investigated herding in them. Working on the study of Chiang & Zheng (2010), the authors Gębka &Wohar (2013) examined the effect of herding in 32 countries over the world. The study show contradictory results to Chiang & Zheng (2010). Surprisingly no herding was found in the markets that were studied as a whole. During their analysis of different industry sectors on a worldwide level, they found that herding was followed in consumer services, basic material and in oil and gas. They were trying to find out the results to confirm herding in global markets while examine individual market. In continuation of investigating herding in industries, Lam and Qiao (2015) found that industries show herding in Hong Kong, predominantly in financial stocks.

Research has proven that emerging markets are more prone to herding. This behavior is less evident in developed markets. The reason is that characteristics of emerging markets are only found in these markets (Economou, et. al 2011).Some characteristics are explained by Bikhchandani and Sharma (2001) which are low level of

transparency in markets and lax reporting requirements. Other characteristics include poor accounting standards, poor regulations, and high cost of information acquisition. Similar results were found by Chang et al. (2000) in their study of developed and emerging markets. Their study includes South Korea and Taiwan as emerging markets and US, Japan and Hong Kong as developed markets. According to a recent research, containing data from 1999-2009, the evidence of herding behavior is also found in emerging markets of Asia, more precisely, China and India. This study also validates the point of view of Lao and Singh (2010).

Different studies have explained the herding using different models, techniques and methods. For instance, Bikhchandani and Sharma, (2001) explained the relation between market capitalisation and tendency of firms to herd, and found that herding is more common in smaller stocks as compared to large, heavily-followed caps. Pinegar, McQueen and Thorley (1996) found that stocks with higher market capitalization respond to good news more quickly than the smaller stocks. The main reasons behind this concept are the lack of proper and complete information on these stocks, fewer recommendations by analysts, and low level of consensus found between investors and market. Similarly, other research studies on herding have contributed towards the design of this research by proposing different methodologies to investigate herding behavior in different markets. These methods as explained by Bikhchandani and Sharma in (2001) are statistic based i.e. they focus on clustering of decisions. They therefore are incapable of recognizing the strand between different types of herding and designs set to test for herding. They have explained this point by arguing that it is difficult to identify the assertions underlying herding and the difficulty in measuring and quantifying them.

From literature we infer that herding is analysed by different authors from different angles using different technique. One such study was conducted by Lakonishok, Shleifer, and Vishny (1992) explained herding to be the inclination of investors towards buying and selling a particular stock at the same time, whose actions are parallel to what is expected independently. The purpose is to identify the pattern of trading and its correlation which may not represent herding behavior. This technique may be biased in the sense it does not accommodate the stock quantity traded. But in the method only numbers of investors are considered. It also fails to identify the trading pattern over different time periods (Bikhchandani & Sharma, 2001).

Another method namely portfolio-change measure of correlated trading was introduced by Wermers (1999) to measure herding. The model gives explanation to herding according to the weight of portfolio taken up by different investors in various stocks and that move in the same direction. This model in its first respect suggests improvements to model proposed by Lakonishok et al. (1992) while receiving criticism at the same time. The criticism takes place due to the fact that it yields results based on spurious herding.

Some detailed description of measures of herding that captures dispersion as suggested by Chang et al. (2000), as they form the basis of this research. The present literature on herding demonstrates that pattern of herd behavior is not consistent across the global markets. The outcomes of studies on herding suggest that there is a wide range of variability depending upon country and timing. One group of analysts spot the existence of herding under different market conditions. This herding showed different strength (Chang et al, 2000; Chiang &Zeng, 2010, Lindhe, 2012; Prosad et al, 2012). On the other hand, second group of analysts held contrasting opinion. According to these analysts, there is no herding in financial markets (Demirer & Kutan, 2010; Garg & Jindal, 2014).

The objective of the investigation of herding in financial markets is quite obvious, as the investors come up with the understanding about market behavior. These kinds of behaviors influence asset prices in the market. Chang et al. (2000) give supportive argument to this statement by providing the explanation of effect of such behavior of investors on the prices of shares. Keeping the above study in mind, it could be stated that intentional herding is not necessarily efficient, and usually deals with sensitive and weak markets. In addition, it is noticed that prices are also affected by noise traders. These noise traders are considered as herding group, that contribute to the movements of prices in great extent. Therefore, we can say that herding behavior refers to market inefficiency, which contradicts the theory of rational asset pricing model. According to the model asset valuation process is adopted to know the efficiency of the assets (Lao & Singh, 2010).

2.6 Hypothesis

H1: There is significant difference between equity return dispersion and average of extreme market returns.

H2: Market returns and cross sectional absolute deviation is non-linearity related during stress condition of market.

H3: Herding is evident in market during the phase when market returns fall.

H4: Herding is evident in market during the phase when market returns rise.

H5: Herding is evident in market during the phase when trading volume is low.

H6: Herding is evident in market during the phase when trading volume is high.

H7: Herding is evident in market during the phase when market volatility is low.

H8: Herding is evident in market during the phase when market volatility is high.

Chapter 03

3. Data and methodology

2.1 Data

This study employee the data of 80 listed companies of each of the following markets Pakistan stock Exchange (PSE), Shanghai stock Exchange (SSE) and Bombay stock Exchange (BSE). Daily, weekly and monthly closing stock prices for the period of ten years from 2006 to 2016 are used for analysis. The historical data is obtained from the web sites www.brecorder.comor www.psx.com.pkand that of India from Bombay Stock exchange website. The data of china will be obtained from Taiwan Journal of Economics from the web sites www.fnetrade.com.

Christie & Huang (1995) has identified (CSSD) cross sectional standard deviation and Chang et al. (2000) has identified (CSAD) cross sectional absolute deviation. These two techniques are generally used to measure the existence of herding behavior among individual trading for stocks. In this study cross sectional standard deviation (CSSD) by Christie & Huang, (1995) and cross sectional absolute deviation (CSAD) by Chang et al, (2000) methodology is used.

In overall market circumstances, Gleason et al. (2004) used both CSAD and CSSD to apprehend herding. To test herd behavior, Although CSSD and CSAD are commonly used methods and these methods apprehend herding of investors' groups or market participants by security specific returns. Some empirical studies shows that other methods have also been used to apprehend herding, in different model structures Wagner (2002) used Lux-Marchasi Model and Hwang and Salmon (2004).

3.2 Methodology

The calculation of the observed stock returns for specific company shares are as follows:

$$R_{i,t} = ln\left[\frac{Pt}{Pt-1}\right] \times 100$$

The above equation shows that

Ri,t = it is observed return of stock of firm i at time t, and

Pt = closing price of the individual returns of stock at time t and t – 1,

$$\boldsymbol{R_{m,t} = \sum Ri,t/N}$$

In equation above the term $\mathbf{R_{m,t}}$ is cross-sectional mean stock of the **N** returns. It is calculated by taking average of all individual stock returns at time **t**, whereas $\mathbf{R_{i,t}}$ is a term denoting the noted stock return of firm **i** at time **t**, and in selected sample **N** is number of firms.

3.3 Model Specification

This study investigates the presence of herding behavior in three different stock markets i.e. Pakistan, India and China stock market. Two methodologies (Christie & Haung, 1995, Chang et al,. 2000 & Gleason et al,. 2004) are used for the data analysis. OLS regression estimation technique is used for the analysis of data. All 80 companies of Pakistani, Chinese and Indian stock market are selected on the basis of market capitalization.

This empirical study is based on the two methodologies of Christie and Huang (1995), Chang et al. (2000) and Gleason et al. (2004). Average proximity is measured by Christie and Haung 1995 to detect herding behavior. The proximity is measured as of realized market returns to individual asset returns by using the model CSSD that is expressed as follows:

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^{N}(R_{i,t}-R_{m,t})^2}{N-1}} \qquad (1)$$

In the above equation the term $\mathbf{R_{m,t}}$ is denotes the cross-sectional average stock of N returns in the portfolios at time **t**, **N** is the number of firms in the portfolio, $\mathbf{R_{i,t}}$ is the individual stock return of firm **i** at time **t**. By approximating the following empirical model proposed by Christie & Huang (2005), this study examines herding behavior among firms.

Regarding the manners of the CSSD of returns, herding behavior signify conflicting forecast from the traditional asset pricing model during the period of financial market crises. At the time period of large market movements, increased dispersion is the result of conflicting responsiveness of individual securities to the market returns i.e. rational asset pricing model, while in contrary comparatively lower dispersion is the result of existing of herd behavior at the time period of large market movements, accordingly this study examines the herding behavior of the market returns by approximating the below empirical model proposed by Christie and Huang (1995).

$$CSSD_t = \propto + \beta_1^U D_t^U + \beta_2^L D_t^L + \epsilon_t \quad (2)$$

The above equation tells us, in return distribution for the time period t, if the returns on the aggregate market portfolio placed in the extreme upper tail than D_t^U = 1, and if not than D_t^U = 0 in return distribution for the time period t, if the returns on the aggregate market portfolio placed in the extreme lower tail than D_t^L = 1, and if not than D_t^L = 0. In this way, the nearness of negative and measurably critical β1 and β2 coefficients would demonstrate group arrangement by market members. Then again, altogether positive coefficients β1 and β2 build up the forecast of level headed resource evaluating model.

To identify herding behavior, Chang et al., (2000) proposed alternative methodology. Chang et al., (2000) contend that the model that is suggested by Christie and Huang (1995) urges characterizing what is implied by the stock market push. They used CSAD rather than CSSD. CSAD can be imparted as takes after: In this review, to assess the value return scattering; Cross-sectional supreme deviation (CSAD) is utilized, the CSAD condition is demonstrated as follows.

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{N} | R_{i,t} - R_{m,t} | \quad (3)$$

In the above condition at time t, $R_{m,t}$ is the normal return of the equivalent weighted market portfolio that signifies the market return, though at time t, $R_{i,t}$ is the individual stock return of firm. To investigate herding behavior, Chang et al., (2000) proposed another technique. The accompanying relapse is utilized to identify the relationship among the value return scattering and the outright estimation of the market return.

The second technique depends on general quadratic connection amongst $CSAD_t$ and $R_{m,t}$ defined by Chang et al. (2000), this non-straight relationship is demonstrated as takes after:

$$CSAD_t = \alpha + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + \varepsilon_t \quad (4)$$

As indicated by Chang et al. (2000), nearness of fundamentally negative non-direct coefficient γ2 affirm the presence of crowding conduct, generally a measurably positive γ2 demonstrates no confirmation of grouping. Gleason et al., (2004) contended this non-straight part will likewise be watched for CSSD when grouping is available amid times of market tense. To get a even more exhaustive examination,

Gleason et al., (2004) test extra two models where it is intended to swap the needy factors in Equations (2) and (4):

$$CSAD_t = \alpha + \beta_1^U D_t^U + \beta_2^L D_t^L + \varepsilon_t \quad \textbf{(5)}$$

$$CSSD_t = \alpha + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + \varepsilon_t \quad \textbf{(6)}$$

It is perceived that rate of increment in scattering is high for whole market returns as market is advancing and contrast with when the market is going downwards. The exploration of asymmetry in both bullish and bearish patterns is checked through evaluation of crowding relapse independently for both positive market and negative market. In particular, framework could be composed as:

$$\boldsymbol{CSAD_t^{Up} = \alpha + \gamma_1^{up} |R_{m,t}^{up}| + \gamma_2^{up} (R_{m,t}^{up})^2 + \varepsilon_t, \quad if\ R_{m,t} > 0} \quad \textbf{(7)}$$

$$\boldsymbol{CSAD_t^{Down} = \alpha + \gamma_1^{Down} |R_{m,t}^{Down}| + \gamma_2^{Down} (R_{m,t}^{Down})^2 + \varepsilon_t, \quad if\ R_{m,t} < 0} \quad \textbf{(8)}$$

Where $\boldsymbol{R_{m,t}^{up}}$ ($\boldsymbol{R_{m,t}^{Down}}$)shows the equivalent returns of weighted portfolio amid the rising(bullish) and declining (bearish) showcase patterns for the time period t, and $\boldsymbol{\left(R_{m,t}^{up}\right)^2}$ ($\boldsymbol{R_{m,t}^{Down}}$)$\boldsymbol{^2}$ are terms that show, when market goes up or down, the squared estimation of equivalent weighted portfolio to explore the non-linearity in market returns. $\boldsymbol{CSAD_t^{Up}}$And ($\boldsymbol{CSAD_t^{Down}}$) term is CSAD ensuing at time t to the market returns when market goes up or down. As per writing, has been watched that non negative relationship exists among returns of market and exchanging bulks (Wermers, 1999; Nofsinger and Sias, 1999). Whereas Li et al. (2009) discovered positive relationship among normal exchanging volumes and market returns of the individual financial specialists. This review likewise inspects conceivable uneven impacts amid times of increased or decreased volume. For every day returns exchanging volume V_t is thought to be increased or decreased if on day t it is more noteworthy or smaller than most recent thirty days moving midpoints. Essentially, for month to month information five months moving midpoints is utilized. The crowding relapse is assessed independently for high and low exchanging volumes. In particular, this plan is spoken to as:

$$\boldsymbol{CSAD_t^{V-high} = \alpha + \gamma_1^{V-high} \left| R_{m,t}^{V-high} \right| + \gamma_2^{V-high} (R_{m,t}^{V-high})^2 + \varepsilon_t,} \quad \textbf{(9)}$$

$$\boldsymbol{CSAD_t^{V-low} = \alpha + \gamma_1^{V-low} |R_{m,t}^{V-low}| + \gamma_2^{V-low} (R_{m,t}^{V-low})^2 + \varepsilon_t,} \quad \textbf{(10)}$$

Where $\boldsymbol{R_{m,t}^{V-high}}$ alludes to market returns when exchanging volume is high and $\boldsymbol{R_{m,t}^{V-low}}$shows the low exchanging volumes state. Altogether, negative coefficients γ2 build up the nearness of grouping in market regarding exchanging volumes. This review inspects the level of grouping as for market unpredictability and explores potential helter kilter impacts. Hellwig (1980) contended that data asymmetry may drive unpredictability, silly financial specialist take after the market inclines by purchasing when costs rise and offer when costs fall so clueless exchanging result in instability, this conduct is indistinguishable to grouping. In this way, expands unpredictability because of nonsensical exchanging results may prompt crowd development. Like our investigation of exchanging volume, we look at conceivable helter kilter impacts amid times of high or low instability. For day by day returns instability δ_t is thought to be high (low) if on day t it is more noteworthy (lesser) then most recent 30 days moving midpoints. So also, for month to month information five months moving midpoints is utilized. The conceivable topsy-turvy impact is researched utilizing taking after experimental determination:

$$\mathrm{CSAD}_{\mathrm{t}}^{\delta^2,\mathrm{high}} = \alpha + +\gamma_1^{\delta^2,\mathrm{high}} \left|\mathrm{R}_{\mathrm{m,t}}^{\delta^2,\mathrm{high}}\right| + \gamma_2^{\delta^2,\mathrm{high}} (\mathrm{R}_{\mathrm{m,t}}^{\delta^2,\mathrm{high}})^2 + \varepsilon_{\mathrm{t},} \quad (11)$$

$$\mathrm{CSAD}_{\mathrm{t}}^{\delta^2,\mathrm{low}} = \alpha + +\gamma_1^{\delta^2,\mathrm{low}} \left|\mathrm{R}_{\mathrm{m,t}}^{\delta^2,\mathrm{low}}\right| + \gamma_2^{\delta^2,\mathrm{low}} (\mathrm{R}_{\mathrm{m,t}}^{\delta^2,\mathrm{low}})^2 + \varepsilon_{\mathrm{t},} \quad (12)$$

Where $\mathrm{R}_{\mathrm{m,t}}^{\delta^2,\mathrm{high}}$ allude to exceptional yield unpredictability and $\mathrm{R}_{\mathrm{m,t}}^{\delta^2,\mathrm{low}}$ speaks to low-return instability, and the term $(\mathrm{R}_{\mathrm{m,t}}^{\delta^2})^2$is processed at the time period t as the square of portfolio showcase return.

3.4 Testing Herding Behavior for Pakistan during crash period

For robustness analysis, we need to know the impact of June 2008financial crises on our outcomes. In this study the effect of April 2008 down turn is estimated. The Pakistan stock exchange was closed on 20 April, 2008 at the points of 15760. But it started decline thereafter during a period of four months the index recorded the level of 9144 points as it is a decrease of 55% (5600) points with respect to the April 2008 level. A “floor” has been set at level of 9144 index points on 20 August, 2008 , below this index was not tolerable. So, the data covering the duration of these four months is separated and the regression equation is estimated.

3.5 Testing Herding Behavior for India during crash period

For robustness analysis, we need to know the impact of June 2008-9 financial crises on our outcomes. Indian stock market (BSE SENSEX) experienced a huge plunge in January 2008. On 21 January, highest ever loss is seen of 1408 points at end of session. Major downfalls on SENSEX are 17 March 2008by 951.03 points,27 June 2008by 600 points and closed at 13,802, 1 July 2008it was 13,000 marks below and closed at 12,962, 6 October 2008 by 724.62 points and closed at 11,802. Similarly, it on 10 October 2008 fell by 800.51 points and closed at 10,527. On 17 October 2008it crashed to the extent of below the psychological 5-figure mark of 10,000 points and closed at 9,975.35. 24 October 2008it lost 10.96% of its value (1070.63 points) on the intra-day trade and closed at 8,701.07, 27 October 2008 - The SENSEX hit an intra-day low of 7,697.39, before closing at 8,509.56. On January 2009, SENSEX plunged by 749.05 points and it's the duration when Satyam fraud highlighted. On 9 March 2009, SENSEX has closed for their lowest point that is 8,160.40 since November 2005.So, the data covering the duration of these four months is separated and the regression equation is estimated.

3.6 Testing Herding Behavior for China during crash period

For robustness analysis, we need to know the impact of 12 June, 2015 financial crises on our outcomes. Instability in Chinese market started on June 2015 and ended on early February 2016. It is due to the bursting of stock market bubble. Within one month A-shares on Shanghai stock exchange lost its one third of value. Over three weeks Shanghai stock market fell 30% as 1400 companies. It's the time of 8-9 July 2015. On 24 August Shanghai index has fallen again by 8.48%, it's the biggest fall since 2007. So, the data covering the duration of these nine months is separated and the regression equation is estimated.

$$CASD_t = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 R^2_{m,t} + \gamma_3 R^2_{m,t} * DM_t + \epsilon_t \quad (13)$$

Where DM_t is the dummy variable that takes the estimation of unity during the crises period, and generally it is 0. In this analysis, cross dummy $\boldsymbol{\gamma_3 R^2_{m,t \times DM_t}}$ is used to capture the non-linearity of returns during the crises period**.**

Chapter 04:

4. Results and Findings

4.1 Descriptive statistics of Pakistani market

Descriptive statistics of Pakistani stock market is presented in table 1 for daily, weekly and monthly data which includes CSSD and CSAD. According to the market capitalization, this study used the data of daily, weekly and monthly of 80 companies of Pakistani stock exchange and the shares of these companies are frequently traded in the market, the sample duration is used from the year 2006 to 2016.

Table 1

Descriptive Statistics of Pakistani market

Sample	Variable	N	Mean %	Standard deviation %	Min %	Max %
Daily	Rm,t	3572	0.011	1.665	-48.869	44.674
	CSSDt	3572	1.937	4.313	0.001	127.398
	CSADt	3572	1.170	2.466	0.000	80.161
Weekly	Rm,t	513	0.011	2.368	-47.687	4.836
	CSSDt	513	2.621	5.339	0.037	110.896
	CSADt	513	1.658	3.490	0.008	78.317
Monthly	Rm,t	118	0.092	0.998	-4.412	4.002
	CSSDt	118	1.684	1.132	0.002	5.587
	CSADt	118	1.096	0.782	0.001	4.023

Based on monthly data, average market returns shown being greater than that of daily and weekly data. When return interval increases, the variation also increases accordingly. But here the dispersion for daily return is higher than that of dispersion of monthly and weekly return that is unexpected. In the table above dispersion magnitude measure is lower for the monthly data as compared to daily and weekly data. Moreover, values estimated shows that mean and variability are different for both CSAD and CSSD models. They are lower for daily, weekly and monthly CSAD measure but higher for daily, weekly and monthly CSSD measure. This relation confirms results indicated by previous research of Granger and Ding, (1993). Their

results explained that absolute deviation (CSAD) measurements are intrinsically less sensitive to the abnormal returns what are called outliers.

4.2 Herding Evidence

4.2.1Regression results; (extreme market movements using CSSD).

Table 2 provides the regression estimation for 80 companies of KSE according to the market capitalization. In this study, two sets (upper and lower) of dummy variables are formed that is D_t^U and D_t^L that describe the difference in behavior of investors which is allied with the extreme market movements. These market movements are upward and downward movements. The methodologies Christie & Huang (1995), Chang et al. (2000) and Gleason et al. (2003) are used, and 5% and 1% criteria is used to limit the dummy variables to 5% and 1% of the upper tail and lower tail of the distribution of market return. Findings of this research are consistent with preceding studies in a manner that confirmation of herding behavior has not found in the duration of extreme market movements.

Table 2:

Panel a: $CSSD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 5% criterion

		5% criterion				
Sample	A	β_1^U	β_1^L	adjR^2	F	Sig
Daily	1.590	3.646	3.275	0.058	110.379	0.00
t-stat	21.536	11.339	10.186			
p-value	0.00	0.00	0.00			
Weekly	2.204	2.176	6.040	0.064	18.410	0.00
t-stat	9.161	2.089	5.800			
p-value	0.00	0.037	0.00			
Monthly	1.575	1.217	0.918	0.068	5.252	0.007
t-stat	14.844	2.653	2.001			
p-value	0.00	0.009	0.048			

For all coefficients, regression results of daily data provide significantly positive coefficients; therefore rational asset pricing models are supported by results in this study. This study in effect forecasts that dispersion increases through the duration of

market stress, as the individual returns vary in their sensitivity to the market returns. Moreover, values of coefficients for upside movements are practically equivalent to the downside movements. 5% and 1% are criteria for whom regression of daily and weekly data provides significantly positive results. It is an evident from the preceding researches, in long run the effect of herd formation average out.

Panel b: $CSSD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at1% criterion

	1% criterion					
Sample	A	β_1^U	β_1^L	adjR^2	F	Sig
Daily	1.708	12.879	9.516	0.138	287.227	0.00
t-stat	25.232	19.463	14.187			
p-value	0.00	0.00	0.00			
Weekly	2.307	9.199	22.981	0.203	66.343	0.00
t-stat	10.858	4.295	10.730			
p-value	0.00	0.00	0.00			
Monthly	1.668	0.888	0.987	0.006	0.672	0.00
t-stat	15.830	0.779	0.866			
p-value	0.00	0.43	0.388			

4.2.2Regression results; (extreme market movements using CSAD)

In this study for regression results we follow the Gleason et al (2004) model for extreme high or low market movements, wherever the herding behavior can also be seen by employing CSAD instead of CSSD as dispersion measure. The results are fundamentally same as results marked in table 2 and CSSD has been taken to be dependent variable. The excessively positive and significant β1 and β2 demonstrate dispersion of stock returns from stock market portfolio returns, specifically non-existence of herd formation. Here, these results are supported by the results of Gleason et al. (2004) that regardless of measure used for dispersion, the findings from both regressions revealed in two tables; 2 and 3.The results don't bolster the nearness of grouping conduct for the individual stocks of Pakistan stock market, the result from both regressions reported in table 2 and 3 do not console the existence of herding formation for companies of Pakistan stock market according to market capitalization. As indicated by Christie & Huang (1995) in extreme stock returns the existences of

positively significant coefficient are supported by the supposition of asset pricing model.

Table 3:

Panel a: $CSAD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 5% criterion

	5% criterion					
Sample	A	β_1^U	β_1^L	adjR^2	F	Sig
Daily	0.966	1.937	2.131	0.061	116.960	0.00
t-stat	22.913	10.554	11.610			
p-value	0.00	0.00	0.00			
Weekly	1.401	1.122	3.956	0.061	17.744	0.00
t-stat	8.894	1.646	5.805			
p-value	0.00	0.01	0.00			
Monthly	1.003	0.937	0.878	0.109	8.165	0.00
t-stat	13.998	3.027	2.835			
p-value	0.00	0.00	0.01			

The findings of table 3 repeated the analysis of table 2. As compared to CSSD, CSAD uses a data that is better fit.

Panel b: $CSAD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 1% criterion

	1% criterion					
Sample	α	β_1^U	β_1^L	adjR^2	F	Sig
Daily	1.054	5.485	5.808	0.104	209.301	0.00
t-stat	26.724	14.220	14.856			
p-value	0.00	0.00	0.00			
Weekly	1.468	3.347	16.120	0.211	69.588	0.00
t-stat	10.624	2.403	11.573			
p-value	0.00	0.017	0.00			
Monthly	1.086	0.633	0.463	0.009	0.490	0.614
t-stat	14.900	0.802	0.588			
p-value	0.00	0.424	0.558			

4.2.3 Non-linearity Regression results; using CSSD and CSAD.

Table 4 shows results of regression that are obtained by estimating model of Chang et al. (2000). It shows on the whole data i.e. daily, weekly and monthly, the results of regression of the equation. In this model quadratic term is incorporated to assess the likelihood of non-linearity towards change in deviation. The model coefficient$\gamma 1$ for daily data, significantly positive affirming that with the absolute returns of market both CSSD and CSAD increases.

Table 4

Panel a: Results of non-linear model; **using CSSD**

Sample	α	γ1	γ2	adjR2	F	Sig
Daily	0.821	1.864	0.014	0.756	5532.688	0.00
t-stat	18.668	37.482	11.805			
p-value	0.00	0.00	0.00			
Monthly	0.889	1.889	-0.374	0.404	40.649	0.00
t-stat	7.391	7.856	-5.215			
p-value	0.00	0.00	0.00			
Weekly	1.613	1.012	0.027	0.832	1269.315	0.00
t-stat	11.748	7.582	9.149			
p-value	0.00	0.00	0.00			

The results show that overall market is efficient and no evidence of herding is seen. These results are not in contradiction with the results of Demirer et al. (2010); these results represent market efficiency and express the discrepancy. Where as in monthly data market is inefficient and evidence of herding is found.

Panel b: Results of non-linear model using CSAD

Sample	α	γ_1	γ_2	adjR^2	F	Sig
Daily	0.615	0.882	0.016	0.914	18913.43	0.00
t-stat	41.147	52.153	39.645			
p-value	0.00	0.00	0.00			
Monthly	0.432	1.609	-0.333	0.586	84.318	0.00
t-stat	6.258	11.644	-8.076			
p-value	0.00	0.00	0.00			
Weekly	1.099	0.505	0.023	0.961	6359.847	0.00
t-stat	25.514	12.063	25.325			
p-value	0.00	0.00	0.00			

Though γ_2 is the nonlinearity term that is statistically significant for monthly data however it indicates the existence of herding behavior because at increasing rate the dispersion of market is decreasing that shows market inefficient. Findings of this result proposed that during the duration of market stress from the market consensus investor's trade away.

$$CSAD_t = 0.432447 + 1.6087581\ I\ R_{m,t}\ l - 0.33303R^2_{m,t} + \epsilon_t \quad \text{(i)}$$

(11.64455)** (- 8.07596) **

The results were graphed such that buying trend of the investors in the market is investigated. It is evident that market returns increases and dispersion increases too. But the nonlinearity term shows that with increase in market returns dispersion decreases. But the rate of increase in market returns more than decrease in dispersion.

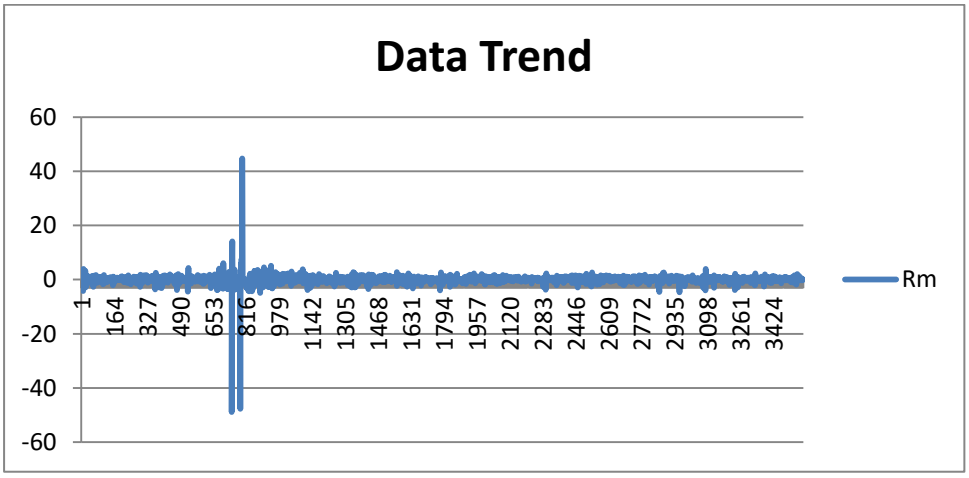

Figure 1: Data Trend of Pakistan

From the graph given above, we infer the results that when the returns increases dispersion decreases but when return decreases dispersion increases that shows the convergence of individual stock returns with market returns. So it shows herding in the Pakistani market.

4.3 Herding behavior; Asymmetric effect

4.3.1Market returns

Results contained in table 5 shows that in bullish and bearish market conditions the herding behavior exists, we use absolute returns because we are concerned about the return size rather than signs, in panel a shows that coefficients γ_1 are significant for daily, weekly and monthly returns when the market conditions are up, whereas coefficient γ_2 shows the similar result to the equation (i) results.

Table 5

Panel a: Result estimation during bull market conditions; (Rm, t <0)

Sample	A	γ_1^{up}	γ_2^{up}	adjR^2	F	Sig
Daily	0.577	1.067	0.014	0.873	6488.922	0.00
t-stat	27.006	42.729	20.331			
p-value	0.00	0.00	0.00			
Monthly	0.489	1.494	-0.318	0.612	50.783	0.00
t-stat	5.747	8.961	-6.148			
p-value	0.00	0.00	0.00			
Weekly	1.423	-0.469	0.422	0.486	139.773	0.00
t-stat	19.354	-3.629	10.478			
p-value	0.00	0.00	0.00			

It is confirmed thatcoefficientγ_1 are significant for the duration of declining market returns for daily, weekly and monthly market returns that is in accordance with the asset pricing model's assumption, whereas the results for coefficient γ_2 are also in accordance with the results through the rising and also declining market conditions. As F-stat provides highly significant results for both models and observed to be good fit. Descriptive power is such that it is practically same in rising and declining market conditions.

Panel b: Result estimation during bear market conditions; (Rm, t <0)

Sample	A	γ_1^{down}	γ_2^{down}	adjR^2	F	Sig
Daily	0.658	0.677	0.012	0.947	15018.51	0.00
t-stat	33.761	31.600	40.337			
p-value	0.00	0.00	0.00			
Monthly	0.384	1.735	-0.353	0.561	34.905	0.00
t-stat	3.463	7.515	-5.300			
p-value	0.00	0.00	0.00			
Weekly	1.192	0.364	0.026	0.997	11548.63	0.00
t-stat	25.838	8.674	29.185			
p-value	0.00	0.00	0.00			

4.4 Trading volume

Panel a and b shows the regression results of asymmetric trading volume of herding behavior. The verification from the panel a demonstrate that in high trading volume condition the coefficient $\gamma_1$are significantly positive and it confirms the asset pricing model's assumption, whereas the value of coefficient γ_2 is also significant and negative that shows herding behavior at the duration when the trading volumes are high.

Table 6

Panel a: Result estimation at high trading volume state

Sample	A	$\gamma_1^{v\text{-}high}$	$\gamma_2^{v\text{-}high}$	adjR^2	F	Sig
Daily	0.870	0.451	-0.003	0.207	187.961	0.00
t-stat	25.212	12.599	-3.463			
p-value	0.00	0.00	0.00			
Monthly	0.384	1.782	-0.357	0.590	33.413	0.00
t-stat	2.818	7.631	-5.962			
p-value	0.007	0.00	0.00			
Weekly	1.231	0.408	0.006	0.398	68.733	0.00
t-stat	20.945	3.979	0.173			
p-value	0.00	0.00	0.863			

Findings from returns i.e. daily and monthly are showing the constant results as the equation (i) proposing inefficiency in the stock market of Pakistan. However, findings from returns i.e. weekly are showing positively significant results. These results demonstrate the weak form of efficiency during the duration of high trading volume in Pakistani stock market, although if time horizon extended these affects wipe out. For a longer period inefficiency in market can be seen and the trading behavior of investors is dependent on some other factors that are unknown.

It is confirmed that from the results in low volume condition, the coefficient γ2 is negatively significant of all returns of daily and monthly data which approves that from market returns dispersion decreases and it also approves the existence of herding behavior however the existence of statistically positive $\gamma_1^{\text{v-low}}$ is demonstrative of comparative efficient and in accordance with the asset pricing model's assumption. The coefficient $\gamma_2^{\text{v-low}}$ is negatively significant for returns of daily and monthly that shows herding behavior when time period is increased.

Panel b: Result estimation at low trading volume state

Sample	α	$\gamma_1^{\text{v-low}}$	$\gamma_2^{\text{v-low}}$	adjR^2	F	Sig
Daily	0.916	0.397	-0.008	0.017	18.303	0.00
t-stat	17.180	5.974	-5.062			
p-value	0.00	0.00	0.00			
Monthly	0.362	1.865	-0.511	0.649	63.778	0.00
t-stat	4.871	9.125	-5.896			
p-value	0.00	0.00	0.00			
Weekly	0.985	0.658	0.020	0.969	4588.346	0.00
t-stat	15.434	9.637	13.818			
p-value	0.00	0.00	0.00			

4.5 Market volatility

This research constructs similar findings when the volatility of market was high, $\gamma_1^{\delta\text{-high}}$ coefficient was significantly positive that demonstrate the increase in dispersion from inefficiency of market returns, although for non-linear the term $\gamma_2^{\delta\text{-high}}$ was negative and significant that representing the decrease in dispersion of market returns of individuals by average market returns, consequently an confirmation of

herding behaviour was acknowledged through the duration of high volatility of market returns.

Table 7:

Panel a: Result estimation at high volatility state

Sample	A	$\gamma_1^{\delta\text{-high}}$	$\gamma_2^{\delta\text{-high}}$	adjR2	F	Sig
Daily	0.891	0.428	-0.006	0.119	119.211	0.00
t-stat	24.791	12.642	-8.085			
p-value	0.00	0.00	0.00			
Monthly	0.535	1.363	-0.270	0.486	16.617	0.00
t-stat	3.930	5.048	-3.970			
p-value	0.00	0.00	0.00			
Weekly	0.822	0.862	0.016	0.974	2597.976	0.00
t-stat	6.262	7.784	6.867			
p-value	0.00	0.00	0.00			

These results are constant through the rational asset pricing model proposing that the market of Pakistan is inefficient and also mispricing in stock market due to specifically important factors that leads market to irrationality.

Panel b: Result estimation at low volatility state

Sample	α	$\gamma_1^{\delta\text{-low}}$	$\gamma_2^{\delta\text{-low}}$	$adjR^2$	F	Sig
Daily	0.938	0.294	0.021	0.006	6.233	0.00
t-stat	13.321	1.524	0.258			
p-value	0.00	0.127	0.796			
Monthly	0.089	3.394	-1.266	0.783	51.506	0.00
t-stat	0.814	6.921	-4.006			
p-value	0.423	0.00	0.00			
Weekly	1.190	0.565	-0.070	0.293	31.494	0.00
t-stat	20.634	5.520	-2.401			
p-value	0.00	0.00	0.018			

For weekly and monthly market returns γ2 coefficient is significantly negative in low volatility condition; when the market volatility is low it proposed herding behavior. These findings are conflicting with Tan et al., (2007).

4.6 Measurement of herding during crash period

In this study discrete data set for the time period of 2008 (20April, 2008 to 20 August, 2008) and cross dummies are used. This was the duration when crash smashes the Pakistani stock market. γ^3 is negative and significant that confirmed the existence of herding behavior during the extreme market movements, precisely when bullish trend is followed by market.

Table 8:

Result estimation of herding during crash period

Sample	A	γ1	γ2	γ3	adjR2	F	Sig
Daily	0.616	0.881	0.016	-0.001	0.914	12616.9	0.00
t-stat	41.183	52.059	37.473	-1.723			
p-value	0.00	0.00	0.00	0.085			

Consequently, it is perceived that no herding behavior is identified in long run however herding exists when markets show high volatility. It means markets could either be bearish or bullish. It is revealed that in Pakistan economic downfall of 2008 shows the bearish trend where market activity was sharply declined. So, the existence of herding behavior is believed to be present to the extent the market activities are showing abnormality but if trading of overall market is taken into account, it will indicate the inefficiency compelled by anonymous trading patterns.

4.7 Descriptive statistics of Indian Market

Descriptive statistics of Indian stock market is presented in table 1 for daily, weekly and monthly data which includes CSSD and CSAD. According to the market capitalization, this study used the data of daily, weekly and monthly of 80 companies of Indian stock exchange and the shares of these companies are frequently traded in the market, the sample duration is used from the year 2006 to 2016.

Table 9:

Descriptive statistics of Indian market

Sample	Variable	N	Mean	Standard deviation	Min	Max
			%	%	%	%
Daily	$R_{m,t}$	2479	0.013	1.310	-9.329	10.441
	$CSSD_t$	2479	2.260	2.262	0.626	32.890
	$CSAD_t$	2479	1.494	0.628	0.453	7.290
Weekly	$R_{m,t}$	498	0.078	1.215	-4.857	6.248
	$CSSD_t$	498	2.153	1.839	0.717	25.575
	$CSAD_t$	498	1.470	0.592	0.564	5.716
Monthly	$R_{m,t}$	84	0.357	1.195	-3.410	5.123
	$CSSD_t$	84	2.176	1.215	0.904	8.698
	$CSAD_t$	84	1.541	0.587	0.663	4.160

Based on monthly data, average market returns shown being greater than that of daily and weekly data. When return interval increases, the variation also increases accordingly. But here the dispersion for daily return is higher than that of dispersion of monthly and weekly return that is unexpected. In the table above dispersion magnitude measure is lower for the monthly data as compared to daily and weekly data. Moreover, values estimated shows that mean and variability are different for both CSAD and CSSD models. They are lower for daily, weekly and monthly CSAD measure but higher for daily, weekly and monthly CSSD measure. This relation confirms results indicated by previous research of Granger and Ding, (1993). Their results explained that absolute deviation (CSAD) measurements are intrinsically less sensitive to the abnormal returns what are called outliers.

4.8Herding Evidence

4.8.1Regression results; (extreme market movements using CSSD).

Table 10 provides the regression estimation for the 80 companies of Indian stock exchange according to the market capitalization. In this study, two sets (upper and lower) of dummy variables are formed that is D_t^U and D_t^L that describe the difference

in behavior of investors which is allied with the extreme market movements. These market movements are upward and downward movements. The methodologies Christie & Huang (1995), Chang et al. (2000) and Gleason et al. (2003) are used, and 5% and 1% criteria is used to limit the dummy variables to 5% and 1% of the upper tail and lower tail of the distribution of market return. Findings of this research are consistent with preceding studies in a manner that confirmation of herding behavior has not found in the duration of extreme market movements.

Table 10:

Panel a: $CSSD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 5% criterion

	5% criterion					
Sample	α	β_1^U	β_1^L	adjR^2	F	Sig
Daily	2.044	1.019	3.329	0.108	150.701	0.00
t-stat	45.213	5.149	16.826			
p-value	0.00	0.00	0.00			
Monthly	2.091	1.285	0.509	0.034	2.468	0.00
t-stat	15.267	2.099	0.832			
p-value	0.00	0.039	0.408			
Weekly	1.977	0.906	2.611	0.101	28.844	0.00
t-stat	23.997	2.528	7.286			
p-value	0.00	0.012	0.00			

For all coefficients, regression results of daily data provide significantly positive coefficients; therefore rational asset pricing models are supported by results in this study. This study in effect forecasts that dispersion increases through the duration of market stress, as the individual returns vary in their sensitivity to the market returns. Moreover, values of coefficients for upside movements are practically equivalent to the downside movements. 5% and 1% are criteria for whom regression of weekly and monthly data provides significantly positive results. It is an evident from the preceding researches, in long run the effect of herd formation average out.

Panel b: $CSSD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 1% criterion

	1% criterion					
Sample	α	β_1^U	β_1^L	adjR^2	F	Sig
Daily	2.203	1.566	4.055	0.036	47.076	0.00
t-stat	48.892	3.507	9.082			
p-value	0.00	0.00	0.00			
Monthly	2.113	4.472	0.792	0.145	8.043	0.00
t-stat	17.039	3.957	0.701			
p-value	0.00	0.00	0.00			
Weekly	2.123	1.376	1.594	0.009	3.244	0.040
t-stat	25.628	1.673	1.938			
p-value	0.00	0.095	0.053			

4.8.2 Regression results; (extreme market movements using CSAD)

In this study for regression results we follow the Gleason et al (2004) model for extreme high or low market movements, wherever the herding behavior can also be seen by employing CSAD instead of CSSD as dispersion measure. The results are fundamentally same as results marked in table 10 and CSSD has been taken to be dependent variable. The excessively positive and significant β1 and β2 demonstrate dispersion of stock returns from stock market portfolio returns, specifically non-existence of herd formation. Here, these results are supported by the results of Gleason et al. (2004) that regardless of measure used for dispersion, the findings from both regressions revealed in two tables; 10 and 11.The results don't bolster the nearness of grouping conduct for the individual stocks of Indian stock market, the result from both regressions reported in table 10 and 11 do not console the existence of herding formation for companies of Indian stock market according to market capitalization. As indicated by Christie & Huang (1995) in extreme stock returns the existences of positively significant coefficient are supported by the supposition of asset pricing model.

Table 11:

Panel a: $CSAD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 5% criterion

	5% criterion					
Sample	A	β_1^U	β_1^L	adjR^2	F	Sig
Daily	1.390	0.834	1.258	0.259	433.391	0.00
t-stat	121.490	16.655	25.114			
p-value	0.00	0.00	0.00			
Weekly	1.374	0.843	1.077	0.239	79.089	0.00
t-stat	56.362	7.947	10.155			
p-value	0.00	0.00	0.00			
Monthly	1.459	1.085	0.641	0.182	10.243	0.00
t-stat	23.944	3.980	2.352			
p-value	0.00	0.00	0.021			

The findings of table 11 repeated the analysis of table 10. As compared to CSSD, CSAD uses a data that is better fit.

Panel b: $CSAD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$ at 1% criterion

	1% criterion					
Sample	α	β_1^U	β_1^L	adjR^2	F	Sig
Daily	1.461	1.448	1.840	0.137	197.216	0.00
t-stat	123.382	12.342	15.684			
p-value	0.00	0.00	0.00			
Weekly	1.443	1.391	1.325	0.100	28.721	0.00
t-stat	56.819	5.514	5.255			
p-value	0.00	0.00	0.00			
Monthly	1.492	3.331	0.837	0.390	27.537	0.00
t-stat	29.442	7.218	1.813			
p-value	0.00	0.00	0.073			

4.8.3 Non-linearity regression results; using CSSD and CSAD.

Table 12 shows results of regression that are obtained by estimating model of Chang et al. (2000). It shows on the whole data i.e. daily, weekly and monthly, the results of

regression of the equation. In this model quadratic term is incorporated to assess the likelihood of non-linearity towards change in deviation. The model coefficient$\gamma 1$ for daily and weekly data, significantly positive affirming that with the absolute returns of market both CSSD and CSAD increases.

Table 12:

Panel a: Results of non-linear model using CSSD.

Sample	A	γ^1	γ^2	adjR^2	F	Sig
Daily	1.504	0.841	-0.008	0.110	154.202	0.00
t-stat	20.797	9.501	-0.502			
p-value	0.00	0.00	0.616			
Monthly	2.208	-0.429	0.224	0.131	7.262	0.00
t-stat	9.698	-1.234	2.591			
p-value	0.00	0.221	0.011			
Weekly	1.562	0.691	-0.007	0.092	26.050	0.00
t-stat	10.908	3.188	-0.121			
p-value	0.00	0.00	0.904			

The results show that overall market is efficient and no evidence of herding is seen. These results are not in contradiction with the results of Demirer et al. (2010); these results represent market efficiency and express the discrepancy. Where as in monthly data market is inefficient and evidence of herding is found.

Panel b: Results of non-linear model using CSAD.

Sample	A	γ_1	γ_2	adjR^2	F	Sig
Daily	1.143	0.374	0.005	0.351	672.427	0.00
t-stat	66.644	17.825	1.301			
p-value	0.00	0.00	0.193			
Monthly	1.518	0.056	-0.018	-0.002	0.938	0.00
t-stat	15.442	0.787	-1.001			
p-value	0.00	0.433	0.320			
Weekly	1.181	0.274	0.034	0.327	121.811	0.00
t-stat	29.787	4.572	2.232			
p-value	0.00	0.00	0.026			

Though γ_2 is the nonlinearity term that is statistically significant however it indicates the existence of herding behavior because at increasing rate the dispersion of market is decreasing that shows market inefficient. Findings of this result proposed that during the duration of market stress from the market consensus investor's trade away.

$$CSAD_t = 1.518314 + 0.056291 I R_{m,t} I - 0.01838 R^2_{m,t} + \epsilon \quad \text{(ii)}$$

(0.786987)** (-1.00056)**

The results were graphed such that buying trend of the investors in the market is investigated. It is evident that market returns increases and dispersion increases too. But the nonlinearity term shows that with increase in market returns dispersion decreases. But the rate of increase in market returns more than decrease in dispersion.

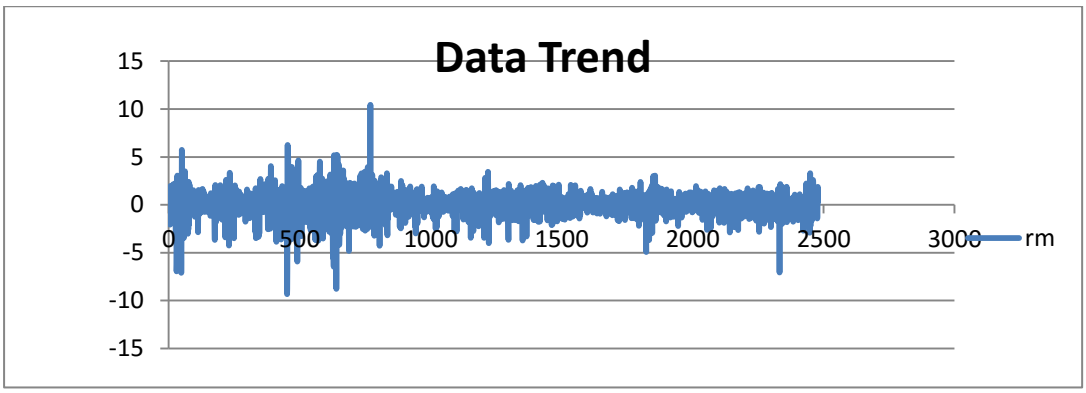

Figure 2 Data trend of India

From the graph given above, we infer the results that when the return increases dispersion decreases that show the convergence of individual stock returns with market returns. So it shows herding in the Indian market.

4.9Herding behaviour; Asymmetric effect

4.9.1Market returns

Moreover table 13 shows that in bullish and bearish market conditions the herding behavior exists, we use absolute returns because we are concerned about the return size rather than signs, in panel a shows that coefficients γ_1 are significant for daily, weekly and monthly returns when the market conditions are up, whereas coefficient γ_2 shows the similar result to the equation (ii) results.

Table 13:

Panel a: Result estimation during bull market conditions; (Rm, t <0)

Sample	α	γ_1^{up}	γ_2^{up}	adjR^2	F	Sig
Daily	1.141	0.339	0.006	0.326	332.265	0.00
t-stat	58.437	13.645	1.295			
p-value	0.00	0.00	0.196			
Monthly	1.398	0.089	-0.009	-0.002	0.928	0.00
t-stat	12.451	1.158	-0.497			
p-value	0.00	0.252	0.021			
Weekly	1.210	0.159	0.060	0.399	94.560	0.00
t-stat	30.853	2.770	4.124			
p-value	0.00	0.006	0.00			

It is confirmed thatcoefficientγ_1 are significant for the duration of declining market returns for daily, weekly and monthly market returns that is in accordance with the asset pricing model's assumption, whereas the results for coefficient γ_2 are also in accordance with the results through the rising and also declining market conditions. As F-stat provides highly significant results for both models and observed to be good fit. Descriptive power is such that it is practically same in rising and declining market conditions.

Panel b: Result estimation during bear market conditions; (Rm, t <0)

Sample	α	γ_1^{down}	γ_2^{down}	adjR^2	F	Sig
Daily	1.155	0.404	0.002	0.361	312.904	0.00
t-stat	38.924	11.649	0.347			
p-value	0.00	0.00	0.729			
Monthly	1.812	0.015	-0.143	-0.042	0.536	0.00
t-stat	8.770	0.085	-1.034			
p-value	0.00	0.933	0.313			
Weekly	1.128	0.474	-0.015	0.292	45.182	0.00
t-stat	14.709	3.872	-0.485			
p-value	0.00	0.00	0.628			

4.10 Trading volume

Panel a and b shows the regression results of asymmetric trading volume of herding behavior. The verification from the panel a demonstrate that in high trading volume condition the coefficient $\gamma_1$are significantly positive and it confirms the asset pricing model's assumption, whereas the value of coefficient γ_2 is also significant and negative that shows herding behavior at the duration when the trading volumes are high.

Table 14:

Panel a: Result estimation at high trading volume state

Sample	α	γ1v-high	γ2v-high	adjR2	F	Sig
Daily	1.384	0.108	0.024	0.172	77.322	0.00
t-stat	39.447	2.787	3.370			
p-value	0.00	0.005	0.00			
Monthly	1.662	-0.256	0.165	0.601	25.897	0.00
t-stat	11.385	-1.334	3.979			
p-value	0.00	0.00	0.00			
Weekly	1.325	0.211	0.045	0.336	55.959	0.00
t-stat	18.257	2.225	2.099			
p-value	0.00	0.027	0.037			

Findings from returns i.e. monthly are showing the constant results as the equation (i) proposing inefficiency in the stock market of India. However, findings from returns i.e. daily and weekly are showing positively significant results. These results demonstrate the weak form of efficiency during the duration of high trading volume in Indian stock market, although if time horizon extended these affects wipe out. For a longer period (monthly) inefficiency in market can be seen and the trading behavior of investors is dependent on some other factors that are unknown.

It is confirmed that from the results of Indian stock market data in low volume condition, the coefficient γ2 is positively significant of all returns of daily and monthly data which approves that from market returns dispersion increases and it also

approves the non-existence of herding behavior however the existence of statistically positive $\gamma_1^{\text{v-low}}$ is demonstrative of comparative efficient and in accordance with the asset pricing model's assumption. The coefficient $\gamma_2^{\text{v-low}}$ is negatively significant for returns of weekly that shows the herding behaviour when time period is increased.

Panel b: Result estimation at the low trading volume state

Sample	α	$\gamma_1^{\text{v-low}}$	$\gamma_2^{\text{v-low}}$	adjR^2	F	Sig
Daily	1.233	0.199	0.017	0.141	93.795	0.00
t-stat	42.923	5.325	2.490			
p-value	0.00	0.00	0.013			
Monthly	1.446	-0.523	0.378	0.176	5.896	0.005
t-stat	10.688	-1.560	2.477			
p-value	0.00	0.00	0.017			
Weekly	1.058	0.408	-0.028	0.226	40.355	0.00
t-stat	22.541	4.216	-0.790			
p-value	0.00	0.00	0.431			

4.11Market volatility

This research construct similar findings when the volatility of market was high, $\gamma_1^{\delta\text{-high}}$ coefficient was significantly positive that demonstrate the increase in dispersion from inefficiency of market returns, although for non-linear the term $\gamma_2^{\delta\text{-high}}$ was negative and significant that representing the decrease in dispersion of market returns of individuals by average market returns, consequently an confirmation of herding behaviour was acknowledged through the duration of high volatility of market returns.

Table 15:

Panel a: Result estimation at the high volatility state

Sample	α	$\gamma_1^{\delta\text{-high}}$	$\gamma_2^{\delta\text{-high}}$	adjR^2	F	Sig
Daily	1.136	0.405	0.002	0.387	395.011	0.00
t-stat	40.831	13.732	0.392			
p-value	0.00	0.00	0.695			
Monthly	1.461	-0.102	0.144	0.480	20.863	0.00
t-stat	8.919	-0.461	2.957			
p-value	0.00	0.647	0.005			
Weekly	1.186	0.323	0.028	0.280	28.350	0.00
t-stat	11.835	2.577	0.970			
p-value	0.00	0.011	0.334			

These results are constant through the rational asset pricing model proposing that the market of India is inefficient (only in monthly) and also mispricing in stock market due to specifically important factors that leads market to irrationality.

Panel b: Result estimation at the low volatility state

Sample	α	$\gamma_1^{\delta\text{-low}}$	$\gamma_2^{\delta\text{-low}}$	adjR^2	F	Sig
Daily	1.181	0.228	0.040	0.224	171.915	0.00
t-stat	54.710	5.863	3.218			
p-value	0.00	0.00	0.00			
Monthly	1.408	-0.220	0.200	0.087	2.579	0.00
t-stat	12.589	-0.745	1.387			
p-value	0.00	0.462	0.175			
Weekly	1.114	0.325	0.019	0.324	31.875	0.00
t-stat	16.296	2.711	0.617			
p-value	0.00	0.00	0.538			

For monthly market returns γ2 coefficient is significantly negative in low volatility condition; when the market volatility is low it proposed herding behavior. These findings are conflicting with Tan et al., (2007).

4.12Measurement of herding during crash period

In this study discrete data set for the time period of 2008-9 (21 January, 2008 to 9 March, 2009) and cross dummies are used. This was the duration when crash smashes the Indian stock market. γ^3 is positive and significant that confirmed the no herding behavior is evident during the extreme market movements, precisely when bullish trend is followed by market.

Table 16:

Result estimation of herding during crash period.

Sample	A	γ1	γ2	γ3	adjR2	F	Sig
Daily	1.149	0.368	-0.002	0.022	0.359	463.163	0.00
t-stat	67.237	17.639	-0.463	5.411			
p-value	0.00	0.00	0.643	0.00			

Consequently, it is perceived that herding behavior is identified in long run however herding does not exist when markets show high volatility. It means markets could either be bearish or bullish. It is revealed that economic downfall of 2008-9, herding is not shown and it shows bullish trend.

So, it is believed that no herding behavior present to the extent the market activities are showing abnormality but if trading of overall market is taken into account, it will indicate the efficiency compelled by anonymous trading patterns.

4.13. Descriptive statistics of Chinese market

Descriptive statistics of Chinese stock market is presented in table 1 for daily, weekly and monthly data which includes CSSD and CSAD. According to the market capitalization, this study used the data of daily, weekly and monthly of 80 companies of Chinese stock exchange and the shares of these companies are frequently traded in the market, the sample duration is used from the year 2006 to 2016.

Table 17:

Descriptive statistics of Chinese market

Sample	Variable	N	Mean	Standard deviation	Min	Max
			%	%	%	%
Daily	$R_{m,t}$	2679	0.029	2.053	-9.483	11.126
	$CSSD_t$	2679	2.394	1.319	0.061	24.963
	$CSAD_t$	2679	2.394	1.319	0.061	24.963
Weekly	$R_{m,t}$	543	0.152	1.901	-8.159	7.425
	$CSSD_t$	543	2.320	1.112	0.061	13.714
	$CSAD_t$	543	1.601	0.632	0.580	5.268
Monthly	$R_{m,t}$	89	0.630	1.572	-3.736	9.373
	$CSSD_t$	89	0.712	1.094	0.003	5.128
	$CSAD_t$	89	1.560	0.551	0.904	3.092

Based on monthly data, average market returns shown being greater than that of daily and weekly data. When return interval increases, the variation also increases accordingly. But here the dispersion for daily return is higher than that of dispersion of monthly and weekly return that is unexpected. In the table above dispersion magnitude measure is lower for the monthly data as compared to daily and weekly data. Moreover, values estimated shows that mean and variability are different for both CSAD and CSSD models. They are lower for daily, weekly and monthly CSAD measure but higher for daily, weekly and monthly CSSD measure. This relation confirms results indicated by previous research of Granger and Ding, (1993). Their results explained that absolute deviation (CSAD) measurements are intrinsically less sensitive to the abnormal returns what are called outliers.

4.14 Herding evidence

4.14.1 Regression estimation; (extreme market movements using CSSD).

Table 18 provides the regression estimation for the 80 companies of Chinese stock market according to the market capitalization. In this study, two sets (upper and lower) of dummy variables are formed that is D_t^U and D_t^L that describe the difference

in behavior of investors which is allied with the extreme market movements. These market movements are upward and downward movements. The methodologies Christie & Huang (1995), Chang et al. (2000) and Gleason et al. (2003) are used, and 5% and 1% criteria is used to limit the dummy variables to 5% and 1% of the upper tail and lower tail of the distribution of market return. Findings of this research are consistent with preceding studies in a manner that confirmation of herding behavior has not found in the duration of extreme market movements.

Table 18:

Panel a: $CSSD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$, at 5% criterion

	5% criterion					
Sample	A	β_1^U	β_1^L	adjR^2	F	Sig
Daily	2.293	0.522	1.486	0.065	93.934	0.00
t-stat	88.309	4.609	13.133			
p-value	0.00	0.00	0.00			
Weekly	2.224	0.245	1.610	0.100	31.127	0.00
t-stat	46.528	1.196	7.852			
p-value	0.00	0.232	0.00			
Monthly	0.542	0.222	2.799	0.334	23.109	0.00
t-stat	5.397	0.540	6.797			
p-value	0.00	0.590	0.00			

For all coefficients, regression results of daily data provide significantly positive coefficients; therefore rational asset pricing models are supported by results in this study. This study in effect forecasts that dispersion increases through the duration of market stress, as the individual stock returns shows variation in their sensitivity relative to the market returns. Moreover, values of coefficients for upside movements are practically equivalent to the downside movements. 5% and 1% are criteria for whom regression of weekly and monthly data provides significantly positive results. It is an evident from the preceding researches, in long run the effect of herd formation average out.

Panel b: $CSSD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$, at 1% criterion

	1% criterion					
Sample	A	β_1^U	β_1^L	adjR^2	F	Sig
Daily	2.293	0.522	1.486	0.065	93.934	0.00
t-stat	88.309	4.609	13.133			
p-value	0.00	0.00	0.00			
Weekly	2.277	0.239	3.646	0.115	36.126	0.00
t-stat	50.147	0.558	8.487			
p-value	0.00	0.577	0.00			
Monthly	0.669	0.666	4.462	0.172	10.191	0.00
t-stat	6.271	-0.665	4.458			
p-value	0.00	0.508	0.00			

4.14.2Regression results; (extreme market movements using CSAD).

In this study for regression results we follow the Gleason et al (2004) model for extreme high or low market movements, wherever the herding behavior can also be seen by employing CSAD instead of CSSD as dispersion measure. The results are fundamentally same as results marked in table 18 and CSSD has been taken to be dependent variable. The excessively positive and significant β1 and β2 demonstrate dispersion of stock returns from stock market portfolio returns, specifically non-existence of herd formation. Here, these results are supported by the results of Gleason et al. (2004) that regardless of measure used for dispersion, the findings from both regressions revealed in two tables; 18 and 19.The results don't bolster the nearness of grouping conduct for the individual stocks of Pakistan stock market, the result from both regressions reported in table 18 and 19 do not console the existence of herding formation for companies of Chinese stock market according to market capitalization. As indicated by Christie & Huang (1995) in extreme stock returns the existences of positively significant coefficient are supported by the supposition of asset pricing model.

Table 19:

Panel a: $CSAD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$, at 5% criterion

	5% criterion					
Sample	α	β_1^U	β_1^L	adjR^2	F	Sig
Daily	2.293	0.522	1.486	0.065	93.934	0.00
t-stat	88.309	4.609	13.133			
p-value	0.00	0.00	0.00			
Weekly	1.540	0.793	0.403	0.088	25.645	0.00
t-stat	54.608	6.518	3.313			
p-value	0.00	0.00	0.00			
Monthly	1.499	0.181	1.053	0.147	6.181	0.00
t-stat	21.840	0.599	3.491			
p-value	0.00	0.552	0.00			

The findings of table 19 repeated the analysis of table 18. As compared to CSSD, CSAD uses a data that is better fit.

Panel b: $CSAD_t = \alpha + \beta_1^U D_1^U + \beta_2^L D_2^L + \epsilon_t$, at 1% criterion

	1% criterion					
Sample	α	β_1^U	β_1^L	adjR^2	F	Sig
Daily	2.364	1.763	1.191	0.025	35.347	0.00
t-stat	93.021	7.000	4.728			
p-value	0.00	0.00	0.00			
Weekly	1.588	0.592	0.808	0.020	6.288	0.00
t-stat	56.732	2.105	2.875			
p-value	0.00	0.030	0.00			
Monthly	1.529	1.151	0.704	0.066	3.107	0.00
t-stat	22.047	2.142	1.311			
p-value	0.00	0.040	0.195			

4.14.3 Non-linearity regression results; using CSSD and CSAD.

Table 20 shows results of regression that are obtained by estimating model of Chang et al. (2000). It shows on the whole data (daily, weekly and monthly) the results of regression of the equation. In this model quadratic term is incorporated to assess the likelihood of non-linearity towards change in deviation. The model coefficient$\gamma 1$ for whole data, significantly positive affirming that with the absolute returns of market both CSSD and CSAD increases.

Table 20:

Panel a: Results of Non-linear model using CSSD.

Sample	α	γ_1	γ_2	adjR^2	F	Sig
Daily	2.129	0.096	0.030	0.104	155.743	0.00
t-stat	49.100	2.373	4.977			
p-value	0.00	0.018	0.00			
Monthly	1.434	0.690	-0.054	0.214	3.852	0.00
t-stat	2.190	0.929	-0.318			
p-value	0.041	0.365	0.754			
Weekly	2.116	0.033	0.044	0.116	36.606	0.00
t-stat	25.712	0.377	2.905			
p-value	0.00	0.706	0.00			

The results show that overall market is efficient and no evidence of herding is seen. These results are not in contradiction with the results of Demirer et al. (2010); these results represent market efficiency and express the discrepancy. Where as in monthly data market is inefficient and evidence of herding is found.

Panel b: Results of non-linear model using CSAD.

Sample	α	γ_1	γ_2	adjR^2	F	Sig
Daily	2.129	0.096	0.030	0.104	155.743	0.00
t-stat	49.100	2.373	4.977			
p-value	0.00	0.018	0.00			
Monthly	1.262	0.232	-0.005	0.214	8.995	0.00
t-stat	10.210	1.773	-0.231			
p-value	0.00	0.00	0.818			
Weekly	1.376	0.180	-0.005	0.109	32.080	0.00
t-stat	28.390	3.507	-0.526			
p-value	0.00	0.00	0.599			

Though$\gamma_2$is the nonlinearity term that is statistically significant however it indicates the existence of herding behavior because at increasing rate the dispersion of market is decreasing that shows market inefficient. Findings of this result proposed that during the duration of market stress from the market consensus investor's trade away.

$$CSAD_t = 1.26224 + 0.231881 | R_{m,t} | - 0.00532 R^2_{m,t} + \epsilon_t \qquad \text{(iii)}$$

$$(1.772542)^{**} \quad (-0.23106)^{**}$$

The results were graphed such that buying trend of the investors in the market is investigated. It is evident that market returns increases and dispersion increases too. But the nonlinearity term shows that with increase in market returns dispersion decreases. But the rate of increase in market returns more than decrease in dispersion.

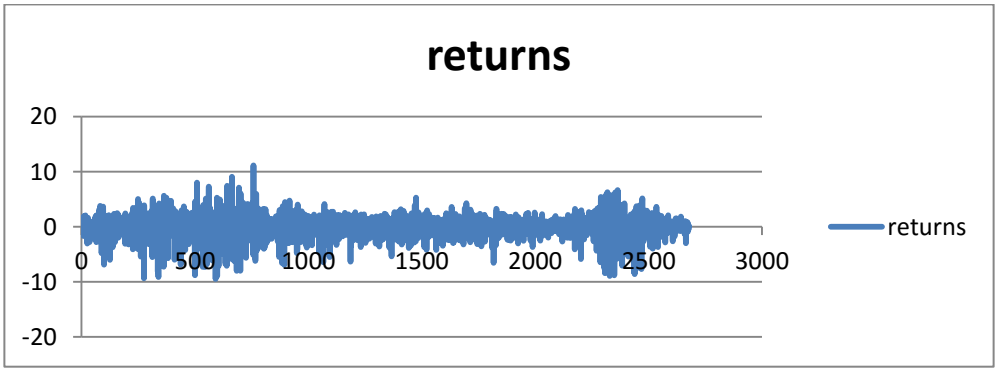

Figure 3 Data trend of China

From the graph given above, we infer the results that when the return increases dispersion decreases that show the convergence of individual stock returns with market returns. So it shows herding in the Chinese market.

4.15herding behavior; Asymmetric effect

4.15.1Market returns

Moreover table 21 shows that in bullish and bearish market conditions the herding behavior exists, we use absolute returns because we are concerned about the return size rather than signs, in panel a shows that coefficients γ_1 are significant for daily, weekly and monthly returns when the market conditions are up, whereas coefficient γ_2 shows the similar result to the equation (iii) results.

Table 21:

Panel a: Result estimation during bull market conditions; (Rm,t >0)

Sample	α	γ_1^{up}	γ_2^{up}	adjR^2	F	Sig
Daily	1.406	-0.049	0.052	0.219	212.120	0.00
t-stat	51.526	-1.831	11.245			
p-value	0.00	0.00	0.00			
Monthly	1.266	0.038	0.041	0.064	2.125	0.00
t-stat	6.261	0.135	0.557			
p-value	0.00	0.894	0.581			
Weekly	1.279	0.264	-0.011	0.142	24.135	0.00
t-stat	17.233	3.363	-0.759			
p-value	0.00	0.00	0.448			

It is confirmed thatcoefficientγ_1 are significant for the duration of declining market returns for daily, weekly and monthly market returns that is in accordance with the asset pricing model's assumption, whereas the results for coefficient γ_2 are also in accordance with the results through the rising and also declining market conditions. As F-stat provides highly significant results for both models and observed to be good fit. Descriptive power is such that it is practically same in rising and declining market conditions.

Panel b: Result estimation during bear market conditions; (Rm, t <0)

Sample	A	γ_1^{down}	γ_2^{down}	adjR^2	F	Sig
Daily	1.300	0.397	-0.022	0.301	253.235	0.00
t-stat	37.312	12.629	-4.973			
p-value	0.00	0.00	0.00			
Monthly	1.398	0.288	-0.019	0.234	4.966	0.016
t-stat	7.900	1.711	-0.700			
p-value	0.00	0.100	0.491			
Weekly	1.473	0.081	0.005	0.076	10.410	0.00
t-stat	23.781	1.200	0.470			
p-value	0.00	0.231	0.638			

4.16Trading volume

Panel a and b shows the regression results of asymmetric trading volume of herding behavior. The verification from the panel a demonstrate that in high trading volume condition the coefficient $\gamma_1$are significantly positive and it confirms the asset pricing model's assumption, whereas the value of coefficient γ_2 is also significant and negative that shows herding behavior at the duration when the trading volumes are high.

Table 22:

Panel a: Result estimation at high trading volume state

Sample	α	$\gamma_1^{v\text{-}high}$	$\gamma_2^{v\text{-}high}$	adjR2	F	Sig
Daily	1.422	0.136	0.024	0.234	217.622	0.00
t-stat	41.775	4.218	4.887			
p-value	0.00	0.00	0.00			
Monthly	1.555	0.484	-0.109	-0.051	0.390	0.00
t-stat	3.838	0.856	-0.882			
p-value	0.00	0.401	0.387			
Weekly	1.305	0.206	-0.014	0.109	17.110	0.00
t-stat	20.976	3.357	-1.420			
p-value	0.00	0.00	0.157			

Findings from returns i.e. daily and monthly are showing the constant results as the equation (i) proposing inefficiency in the stock market of China. However, findings from returns i.e. weekly are showing positively significant results. These results demonstrate the weak form of efficiency during the duration of high trading volume in Chinese stock market, although if time horizon extended these affects wipe out. For a longer period inefficiency in market can be seen and the trading behavior of investors is dependent on some other factors that are unknown.

It is confirmed that from the results in low volume condition, the coefficient $\gamma 2$ is negatively insignificant of all returns of daily and monthly data which approves that from market returns dispersion decreases and it also approves the existence of herding behavior however the existence of statistically positive $\gamma_1^{\text{v-low}}$ is demonstrative of comparative efficient and in accordance with the asset pricing model's assumption. The coefficient $\gamma_2^{\text{v-low}}$ is negatively significant for returns of daily and monthly that shows the herding behavior when time period is increased.

Panel b: Result estimation at low trading volume state

Sample	A	$\gamma_1^{v\text{-}low}$	$\gamma_2^{v\text{-}low}$	adjR2	F	Sig
Daily	1.200	0.264	-0.007	0.297	264.033	0.00
t-stat	43.761	10.574	-1.797			
p-value	0.00	0.00	0.073			
Monthly	1.496	0.049	-0.006	-0.084	0.028	0.00
t-stat	5.476	0.222	-0.179			
p-value	0.00	0.826	0.859			
Weekly	1.488	0.055	0.040	0.161	23.990	0.00
t-stat	19.649	0.606	2.156			
p-value	0.00	0.545	0.032			

4.17Market volatility

This research construct similar findings when the volatility of market was high, $\gamma_1^{\delta\text{-}high}$ coefficient was significantly positive that demonstrate the increase in dispersion from inefficiency of market returns, although for non-linear the term $\gamma_2^{\delta\text{-}high}$ was negative and significant that representing the decrease in dispersion of market returns of individuals by average market returns, consequently an confirmation of herding behavior was acknowledged through the duration of high volatility of market returns.

Table 23:

Panel a: Result estimation at high volatility state

Sample	A	$\gamma_1^{\delta\text{-}high}$	$\gamma_2^{\delta\text{-}high}$	adjR^2	F	Sig
Daily	1.194	0.352	-0.017	0.304	180.598	0.00
t-stat	29.674	10.157	-3.378			
p-value	0.00	0.00	0.00			
Monthly	1.400	0.120	-0.017	-0.115	0.074	0.00
t-stat	3.439	0.384	-0.379			
p-value	0.00	0.706	0.709			
Weekly	1.490	0.006	0.026	0.093	7.136	0.00
t-stat	11.569	0.048	1.148			
p-value	0.00	0.962	0.253			

These results are constant through the rational asset pricing model proposing that the market of Chinese is inefficient and also mispricing in stock market due to specifically important factors that leads market to irrationality.

Panel b: Result estimation at low volatility state

Sample	A	$\gamma_1^{\delta\text{-low}}$	$\gamma_2^{\delta\text{-low}}$	adjR^2	F	Sig
Daily	1.251	0.224	0.007	0.276	163.121	0.00
t-stat	41.270	6.759	1.141			
p-value	0.00	0.00	0.25			
Monthly	1.726	-0.539	0.174	0.021	0.815	0.00
t-stat	7.426	-1.223	1.277			
p-value	0.00	0.239	0.219			
Weekly	1.342	0.144	-0.007	0.044	4.067	0.019
t-stat	17.046	1.124	-0.197			
p-value	0.00	0.263	0.844			

For weekly market returns γ2 coefficient is insignificantly negative in low volatility condition; when the market volatility is low it proposed herding behavior. These findings are conflicting with Tan et al., (2007).

4.18Measurement of herding during crash period

In this study discrete data set for the time period of 2015-16 (12 June, 2015 to early February, 2016) and cross dummies are used. This was the duration when crash smashes the Chinese stock market. γ^3 is negative and significant that confirmed the existence of herding behavior during the extreme market movements, precisely when bullish trend is followed by0 market.

Table 24:

Result estimation of herding during crash period.

Sample	α	γ1	γ2	γ3	adjR2	F	Sig
Daily	0.000	0.005	-0.001	0.000	0.126	129.943	0.00
t-stat	0.156	5.916	-11.977	-1.471			
p-value	0.875	0.00	0.00	0.142			

Consequently, it is perceived that no herding behavior is identified in long run however herding exists when markets show high volatility. It means markets could either be bearish or bullish. It is revealed that economic downfall of 2015-16 shows the bearish trend where market activity was sharply declined. So, the existence of herding behavior is believed to be present to the extent the market activities are showing abnormality but if trading of overall market is taken into account, it will indicate the inefficiency compelled by anonymous trading patterns.

Chapter05

5. Conclusion

5.1Key findings

Detailed study about herding behavior indicates the presence of herding behavior amongst investors in Pakistani, Indian and Chinese stock markets. Herding is actually related to a person's psychology where different investors follow each other in the financial world rationally or irrationally. This behavior reveals market inefficiency and abnormality in market volatility. Two different methodologies as suggested by Christie and Huang (1994) are used to identify herding behavior. Chang, Cheng and Khorana (2000) were the three researchers employed to identify whether the pattern of market returns correlate with the predictions of capital asset pricing model (CAPM) during market stress period. Daily, weekly and monthly results based on data of Pakistani, Chinese and Indian stock exchange indicate that no herding prevails during any market condition.

The factual tests indicate that dispersion of equity return tend to increase during the periods of extreme price movements rather than decreasing and hence depicting the absence of any herding behavior. The Pakistani, Chinese and Indian equity markets show unvarying results as suggested by Christie and Huang (1995). The findings are supporting rational asset pricing model and indicate a higher degree of dispersion of equity related returns i.e. no herding during extreme high and low price movement days. It also pinpoints the efficiency experienced by markets during the periods of extreme market movements. This is the reason why Christie and Huang (1995) model suits Pakistani, Chinese and Indian markets especially during the extreme movements shown by market returns.

The outcomes estimated by Chang et al (2000) model show no signs of herding. These outcomes do not support rational asset pricing model. The increases in market dispersion at an increased rate show inefficiency of the market rather than herding. Our findings suggest that during high stress period, investor's trade away with what we call as market consensus. Results also show that assets are inappropriately priced in Pakistani, Chinese and Indian market because of lack of proper information to traders, low monitored market structure and uncertainty in trends shown by market.

Sometimes the presence of people speculating for only a short time period also effects pricing mechanism.

The study has also taken into account potential asymmetric effects relating to market returns, volume of trading and market volatility in corroborating herd formation during the period of extremes using daily, weekly and monthly returns. At inception dispersion between individual and market returns converges, but after reaching a certain point, returns' crowding disappeared and started rising due to inefficiency and mispricing. As far as emerging markets like Pakistan, China and India are concerned, a higher level of equity return dispersion was documented (hence no herding) during both extreme conditions i.e. during the days when prices were either increasing or decreasing. This increase of return dispersion in arising markets may be due the inefficiency or incomplete information disclosures.

Whilst the study was conducted with regard to trading volumes, it was revealed that the results are similar for low trading volumes as well which confirm an upward movement in market returns and no herding. But at the same time negative linear coefficient indicates the inefficiency of market and contradicts the assumptions used in rational asset pricing model. It also should be noticed that the patterns of market returns in relation to the high trading volumes show consistency with rational asset pricing model when daily returns were taken into account. The Rational asset pricing model suggests the presence of linear correlation between dispersion of individual asset returns and total market return. It also suggests that dispersion related to individual asset returns must increase as the absolute market return also shows increase but this is a short term effect disappearing with the increase in time horizon. Hence, it is concluded that when the trading volume is high then emerging markets like Pakistani, Indian and Chinese markets show weak form of efficiency, and the behavior of investors is rational in high trading volumes condition.

Asymmetric affect related to market volatility results against any herding behavior. In a phase when market returns are highly volatile, there would be increased dispersion of returns in a relation to average market returns. So, herding can be identified during high volatility in market returns. Results do not support the assumption of rational asset pricing model. During low market volatility herding is not noticed.

5.2 Policy implications

Results of overall markets suggest that they are not in consistency with capital asset pricing model. It should be noted that prices deduced using this model would not show the fair value of assets. Pakistani, Indian and Chinese researchers would investigate implications and consequences of these results. As asset prices may be misleading and the markets are inefficient, care should be taken by local and foreign investors and they need to attain a higher number of securities to diversify their investment to be parallel with the norms of otherwise normal markets.

5.3Future research and limitation

This study examines herding of the companies classified on the basis of market capitalization and it takes into consideration the returns specific to individual share prices. Due to the lack of database and congruous market structure, other different forms of herding could not be included. This research could be extended by utilizing industry specific data from Pakistani, Indian and Chinese stock market if further analysis is required about industry specific herding and the factors that cause overall inefficiency in markets and illustrate the structure of investor's trading activities. Later researches should focus on separating the herding behavior shown by institutional and individual investors of Pakistan, India and China.

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