

## **Herding Behavior: A case study of Karachi Stock Exchange**

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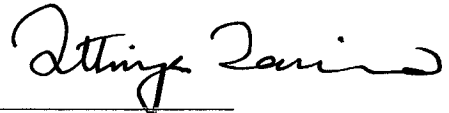
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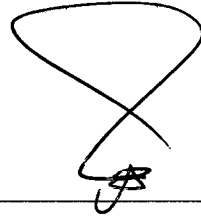
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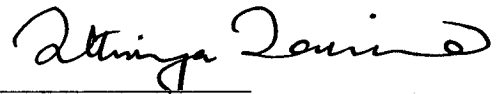
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## Abbreviations

CSSD	Cross sectional standard deviation
CSAD	Cross sectional absolute deviation
EMH	Efficient market hypothesis
KSE	Karachi stock exchange
USA	United States of America
CAPM	Capital asset pricing model
MFD	Mutual funds demand
NMFB	Number of mutual funds buying
NMFS	Number of mutual funds selling
PIGS	Portuguese, Italy, Greece, Spain
MSSUR	Markov Switching Seemingly Unrelated Regression
TSE	Taiwan stock exchange
BSD	Buying and selling difference
DSE	Dhaka stock exchange
SSE	Shanghai stock exchange
MSE	Mumbai stock exchange

## List of Tables

<b>Table 5.1</b>	Estimation of herding behavior in normal market conditions
<b>Table 5.2</b>	Estimation of herding behavior in stress market conditions
<b>Table 5.3</b>	Estimation of herding behavior in bearish and bullish market conditions
<b>Table 5.4</b>	Estimation of herding behavior on annual basis

## List of Figures

<b>Figure 3.5.1</b>	KSE 100 index from Jan 2001 to July 2015
<b>Figure 4.1</b>	CSAD & RMT of cables and electrical goods from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.2</b>	CSAD & RMT of cement from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.3</b>	CSAD & RMT of close end mutual funds from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.4</b>	CSAD & RMT of engineering from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.5</b>	CSAD & RMT of food and personal care products from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.6</b>	CSAD & RMT of glass and ceramics from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.7</b>	CSAD & RMT of insurance from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.8</b>	CSAD & RMT of investment banks from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.9</b>	CSAD & RMT of jute from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.10</b>	CSAD & RMT of leasing from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.11</b>	CSAD & RMT of leather and tanneries from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.12</b>	CSAD & RMT of paper and board from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.13</b>	CSAD & RMT of pharmaceuticals from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.14</b>	CSAD & RMT of refinery from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.15</b>	CSAD & RMT of sugar and allied industries from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.16</b>	CSAD & RMT of synthetic and rayon from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.17</b>	CSAD & RMT of tobacco from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.18</b>	CSAD & RMT of textile spinning from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.19</b>	CSAD & RMT of textile from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.20</b>	CSAD & RMT of transport from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.21</b>	CSAD & RMT of modarbas from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.22</b>	CSAD & RMT of automobiles from 1 <sup>st</sup> Jan 2007 to July 2015

<b>Figure 4.23</b>	CSAD & RMT of commercial banks from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.24</b>	CSAD & RMT of chemicals from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.25</b>	CSAD & RMT of power generation and distribution from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.26</b>	CSAD & RMT of health from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.27</b>	CSAD & RMT of oil and gas exploration from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.28</b>	CSAD & RMT of oil and gas marketing from 1 <sup>st</sup> Jan 2007 to July 2015
<b>Figure 4.29</b>	CSAD & RMT of KSE from 1 <sup>st</sup> Jan 2007 to July 2015

"Knowledge and good manners are the value of your soul, so strive to achieve them, for however much your knowledge and good manners increases, so will your value and worth accordingly."

-Imam Ali (AS)

# *Dedication*

*This humble effort of mine is purely dedicated to my Beloved Parents and my Brothers and Sweet Sisters (Next to God) and also to my idle teacher Dr. Attiya Yasmin Javed (My Idle and Symbol of Inspiration). Their bestowed guidance and unending prayers make me able to gain success in the research activity.*



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*Ubaid Ur Rehman*

## ***Abstract***

*This research study is about to examine the behavior of investors about investment decision making into Karachi Stock Exchange (KSE) and its sectors, more precisely it is about to catch the occurrence of herding behavior in KSE. (CSSD) proposed by Christi and Huang (1995) and (CSAD) suggested by Cheng and Khorana (2000) methods are used to estimate the herding behavior in KSE market, by using the daily data of stock prices for period of January 2007 till July 2015. NO Significant evidence of herding behavior in KSE and but in some of its sectors found in normal market conditions. Further, it is also found that herding behavior changes as the market conditions changes with time to time. Herding behavior is most likely to occur during extreme market conditions, in lower tale of market herding have high tendency to occur. It is also found that the bearish and bullish market conditions have movements of herding behavior at lower extreme (bearish) in most of the sectors of Karachi Stock Exchange.*

## Table of Contents

<b>Chapter 1</b>	3
Introduction	3
1.1 Background	3
1.2 Herding Behavior:	7
1.3 Significance of study	9
1.4 Purposes of the study	9
1.5 Organization of the study	10
<b>Chapter 2</b>	11
2.1 Review of Literature	11
2.2 Critical analysis of Literature	21
2.3 Concluding remarks	22
<b>Chapter 3</b>	23
Data and Methodology	23
3.1 Methodological Framework	23
3.2 Equally Weighted Average return	24
3.3 Cross-Sectional Absolute Deviation	24
3.4 Cross-Sectional Standard Deviation	26
3.5 Data	29
3.5.1 Karachi Stock Exchange (KSE)	29
<b>Chapter 4</b>	32
4.1 Graphical Analysis between CSAD and RMT	32
4.2 Concluding remarks	41
<b>Chapter 5</b>	42
Empirical Findings and Discussion	42
5.1 Estimation of herding behavior in Normal market condition	42
5.2 Estimation of herding behavior in “stress market conditions”	45

5.3 Estimate herding in bearish and bullish market conditions	49
5.4 Estimation of herding behavior on annual basis	53
5.5 Concluding remarks	57
<b>Chapter 6</b>	<b>58</b>
6.1 Conclusion	58
6.2 Policy suggestions	61
<b>References</b>	<b>62</b>
<b>Appendix</b>	<b>65</b>

# Chapter 1

## Introduction

### 1.1 Background

The word “herding” is frequently used in the finance prose to define the correlation of investor behavior causing by replicating other investors’ trading activity. This correlation in activity may trunk from informational forces, as the observation of previous trades can be so informative that investors are willing to pay no attention to their own current information. As a result, herding behavior clues a group of investors to move in the same direction, hostile stock prices added away from their economic basics, affecting price momentum and more instability. People, while building their ranges, are swayed by a number of aspects and among those aspects the selections made by other people also play a vigorous role *Shefrin and Bondt (2008)* . For example, if a person desires to have lunch in a cafeteria or select a college for advance study, he or she would most possibly follow the propositions from people who have experienced the same decision in the previous. Cafeterias having additional guests and similarly universities with further students would probable to be more eye-catching to the person. So, if it’s the situation then this behavior is named as herd behavior. Herd behavior is not only limited to our common everyday selections but it smears to financial choices of stakeholders as well *Andrea and Welch (1996)*. Stakeholders, while building their ranges of investment in financial markets, are severely influenced by recent market tendency, and movements and propositions of financial experts. It is decisive for policy architects to know the investment behavior of investors in an economy thus they can control and forecast the financial markets in an improved way.

There are two contrary clarifications for investment behavior of financiers i.e. the customary opinion of behavior of stakeholders in financial market and the description provided by behavioral finance *Ahsan* (2013). The customary opinion on investment behavior is mostly linked with (EMH) defined by *Fama* (1970) has specified in his work that if values completely approve the whole available figures then the markets are proficient. This view adopts that stockholders are arbitragers and they perform rationally whereas making investment verdicts in financial flea market.

The outlook of interactive finance contradicts the indication that investors are balanced and arbitragers. This justification based on severely on the sensibility of nominees as stated by *Barberis and Thaler* (2003) in their reading. This clue arises as a outcome of disappointment of traditional model to describe the behaviors of stakeholders in the (financial market).

*Bikhchandani and Sharma* (2000) have indicated in their work that if financiers are intentionally following the activities of some financial experts or they are deliberately influenced by the idea of specific investors while building their stock assessment in the financial market, then they would be a part of herding. Movements in stock rates have extreme impact for economists and herd behavior aids them to forecast the behavioral effect on the prices as well as their yields of stocks in financial market.

Herd behavior acknowledged significant responsiveness from both economists and consultants in stock market in the last couple of years. Furthermost of the empirical studies have been showed

for USA and Asian stock markets. *Christi and Huang* (1995) have studied stock market of USA and catch no robust indication for occurrence of herd behavior. *Khorana and Chang* (2000) have also established their findings. However, *Khorana and Chang* (2000) find positive sign for herd behavior in the stock markets of “Taiwan and South Korea”.

There are mixed results for the event of financial markets of “china”. *Kutan and Riza* (2006) have observed the marks of herd behavior in stock markets of “China” and find no sign for that. However, some of other studies tested their findings. *Tan and Nelling* (2008) and *Weifeng and Chang* (2010) have also observed the herd behavior in “Chinese stock markets” and find strong positive sign for the same. *Khorana and Chang* (2000) and *Zheng* (2010) have ominously added towards the works of herding behavior and catch that bulk of the countries they study herd about the stock market of “USA” and that USA has key impact on herding behavior in other countries.

Likewise, several studies have also been designated to emphasis herd behavior of investors in stock markets of “European Union”. *Thomas and Jiandog* (2009) conducted study of financial markets in “Greece” and find weak positive sign for herding behavior in stock market of “Athens”. Similarly, *Zheng* (2010) and *Khan* (2011) find the occurrence of herding behavior between advanced economies in European Union. Also, *Saastamoinen* (2008) and *Ohlson* (2010) find positive indication for herding behavior of investors in financial markets of “Finland” and “Sweden” respectively.

Decision building in the stock markets is indeed challenging for the scholars. There are two main methods to make investment valuations in the stock market. One is rational expectation

method and other is adaptive expectation method known as herding behavior. In rational expectation method, investors make decision about investment on the basis of their own investigation about the stocks *Falkenstein* (1996), where in adaptive expectations method; investors imitate others *Welch and Sushil* (1992).

Different opinions about the wisdom of adaptive expectations are also suggested by the literature. One is that agents copy each other for reputational commitments or follow their peer group to keep reputation in the market *Stein et al* (1992) while the other is information flow hypothesis or information cascade which leads to adaptive expectations or indirectly leads to herding in the market *Welch and Sushil* (1992).



## 1.2 Herding Behavior:

A very fetching amount of literature is present on scrutinizing the investment behavior in equity markets. Amongst the many persuasive factors proposed by the literature effecting investment decisions include herding behavior as well. Herding is well-defined simply as: "to mimic the investment decisions of other investors". In further detail, when investors in equity markets follow others surpassing their own information and understanding of the market, this specific behavior is stated as herding behavior. Here several questions are motivated by the term herding i.e. Who is the imitator and by whom they imitate? Moreover it is sensible or not? And in what type of market herding occurs?

Usually there are two kinds of investors in the market – the capital owners and the fund managers. The fund managers are more likely to herd because of their tendency of avoiding risks and maintaining status in the market *Stein et al* (1992). The repute of a manager will suffer except all the managers make same investment decision to earn loss or profit. Moreover, the agents are evaluated with the relevance of other agents so it also builds source for herding by agents to their corresponding peer group.

The stream of information also clues investors to make investment decisions on the basis of others *Trueman* (1994) and *Welch and Sushil* (1992). When the info gathers from well up-to-date organizations, the investors replicate the earlier trade decisions of well-informed organizations.

Any other cause of herding is the features of stock. When some investors desire the stock with same characteristics, they invest in that specific stock. Finally, it signifies the same decision of some other investors which leads to herding behavior *Falkenstein* (1996).

So, herding may be of three types: 1) the reputational herding in which agents follows their peer groups, 2) the information cascade that leads investors to copy some other agents, and 3) herding in which a stock of common characteristics is preferred by other investors. One other kind may also be referred as herding which is analytical herding. In this kind of herding the investors keep an eye on others , analyze and follow the same signals of the particular stock, so they make decision on their personal analysis which eventually represents preference of investors in that specific stock, which originates under the canopy of herding behavior *Stein and Froot* (1992).

Herding can be specified as ridiculous or sensible investment behavior. Suppressing personal beliefs and following others unseeingly is reflected as trivial behavior of the investor. On the other hand, principal-agent-model is reflected as rational behavior wherever agents follow their peer crowd to keep their reputation in the market *Stein et al* (1992). Informational stream also causes investors to monitor and follow leading investors in this stream *Welch and Sushil* (1992).

### **1.3 Significance of study**

Investment behavior has been a region of interest for agents, investors as well as academic scholars. Past tells that foolishness in investment behavior have been the motive behind main ups and downs in the market. Herding is one such behavioral abnormality which disobeys the efficient market hypothesis (EMH).

According to EMH, investors make informed choices and determine their expected returns built on equilibrium model like Capital Asset Pricing Model (CAPM). However in circumstance of herding, investors imitate the actions of mass. They do not make decisions built on their own analysis which leads to mispricing of stock prices. It leads to an unproductive market state considered by hypothetical bubbles. Hence to study herding behavior is most important phenomena especially for portfolio managers, agents, investors and scholars.

### **1.4 Purposes of the study**

The purpose of this study is as follows:

- To examine the presence of herding in normal market conditions at Karachi Stock Exchange (KSE) as a whole and in its sectors as well i.e. examine whether the herding pattern is nonlinear in nature as proposed by Khorana and Chang (2000).
- To investigate the presence of herding in conditions of stress(extreme) market at Karachi Stock Exchange and its sectors as suggested by Christi and Haung (1995).

- To capture the presence of herding in bull and bear market conditions separately.
- To observe the short-run dynamics of the herding behavior the market also be analyzed on yearly basis, using method proposed by Zheng (2010).

## **1.5 Organization of the study**

This study is classified into six chapters; after the introductory chapter the second chapter comprises the analysis about the literature of the herding behavior. Third chapter of the study involved methodology and collection of data, explanation, dynamic forces and the calculations of variables, in fourth chapter graphical affiliation between cross sectional absolute deviation (CSAD) and average market returns are described. Empirical estimation and investigation of the estimated results explained in chapter five, at the final stage conclusion, limitations of the study and policy implications are explained in last chapter of this study.

## Chapter 2

### 2.1 Review of Literature

There are number of studies on herding behavior for the developed markets however; few studies have been done for emerging markets. This chapter reviews the relevant literature in this area. The first major contribution towards inspecting the herding behavior was made by the *Christi and Huang* (1995). They presented CSSD method to inspect the herding behavior of the investors. CSSD method contracts with both stress market conditions i.e. high market and low market conditions. There are two dummy variables which categorizes the market situations with lower and upper limit and for each market condition. Here, the deviation implies the dispersion of the returns of entire market and return on individual equity. The authors concluded that, the return on the individual equity would not be much disseminated if the individuals disregard their own analysis and basic asset pricing certainties along with imitation behavior. They further deduced that overall market returns and overall deviation would be less than the cross-sectional standard deviation.

The returns on shares of listed firms in the stock market are used as proxy for estimation of cross-section standard deviation however it was condemned on different basis. For example, what will define the upper and lower boundaries of the market? There is no single rule that would apply to outline the upper and lower boundaries, since each market has different characteristics. Another reason is that different markets have several characteristics and are time variant. Moreover, the CSSD method is not much effective in all circumstances because for the

small data set it covers the extreme market conditions whereas, markets are operated under the normal conditions.

*Khorana and Chang* (2000) introduced the cross-sectional absolute deviation (CSAD) method to replace the CSSD method. They used the absolute deviation as a replacement for standard deviation and applied this to normal market conditions which became more valid compared to the CSSD. By using the CSAD method *Khorana and Chang* (2000) "found no significant herding in developed equity markets e.g. USA and Hong Kong; however, they found that investors in developing markets like South Korea and Taiwan do herd significantly. Compared to the cross-sectional standard deviation (CSSD), cross-sectional absolute deviation (CSAD) method did not acquire much criticism, and due to its validity, much literature is based on this method".

Another and alternative methodology introduced by *Sias* (2004) to detect herding behavior in the investment of mutual funds. Under this approach, "he used standardized independent and dependent variables, which included the mutual funds demand function and return on equity variables". The method of investment in mutual funds was dissimilar to CSAD and CSSD, because it used the mutual funds transactions for analysis.

*Kutan and Riza* (2006) observed "herding in Chinese stock souks by applying CSAD technique. They used daily stock return data from 1999 to 2002 for 375 Chinese stocks and found no indication of herding. One of the encounters accompanying with the approach pronounced above is that it wants the classification of thrilling returns. Note that this approach is rather illogical by

using a value of 1% or 5% as the cutoff point to recognize the upper and lower ends of the return distribution. In practice, investors may fluctuate in their sentiments as to what procedures an extreme return and the features of the return spreading may variant over time". In accumulation, herding behavior may become more marked during periods of market trauma as related to over the whole return distribution. In fact, "the CSSD method internments herding only throughout stages of extreme returns. Additional challenges ascend when applying this method to Chinese stock market data, since the comparatively small history of these markets sorts it tough for investors to classify when extreme returns befall".

*Tan and Nelling* (2008) observed the herding behavior in Chinese stock markets both in A shares market and B shares market. "A shares market deals with the local investors more intensively, whereas in B shares market international investors have major contribution. They probed the markets on three different frequencies of the data i.e. daily, weekly and monthly". They detected that the share markets were characterized on herding behaviors on daily basis rather on weekly and monthly time horizons. They clinched that herding overcome for short time period. *Tan and Nelling* (2008) used "the traditional CSSD (cross-sectional standard deviation) and CSAD (cross-sectional absolute deviation). However, they favored the CSAD over CSSD, because this method also covered the normal market conditions in contrast with CSSD which only reflected extreme market situations".

*Tan and Chang* (2010) in their study on Chinese stock markets based on 1996-2007 data of both the markets (i.e. Shanghai A & B shares market and Shenzhen A & B shares market). "They applied quantile regression equation on both markets at aggregate and sector levels. They

originate that at lower and median quantile, there was more tendency of investor's herding as compared to the higher quantile. They further found that the quantile regression analysis results are affiliated with the simple regression analysis i.e. the A shares market faced investor's herding whereas the B share market had no evidence of investor's herding. Although in B shares market, the lower quantiles had greater tendency of herding as compared to the higher quantile but it was insignificant alike the A shares market". Finally, they confirmed the presence of the distributional effects in Chinese stock markets. They recommend that one must take into account these effects while analyzing equity markets.

*Weifeng and Cheng* (2010) investigated the trade pattern of mutual funds and the existence in Taiwan Stock market. They found that trade pattern shows that the institutional funds have herding behavior and the existence of mutual funds has grown rapidly in this particular market. "By applying *Sias* (2004) method, they found that normally mutual funds follow their own trade arrays instead of the actions of other mutual funds. Further, they decomposed the equation into two parts for different inter-temporal comparisons. For decomposition, they standardized the variable MFD (Mutual Funds Demand), NMFB (Number of Mutual Funds Buying) and NMFS (Number of Mutual Funds Selling) and assigned them zero mean and unit variance. Finally, they found significant herding in mutual funds trading and proposed that in mutual funds herding prevail due to the fund manager's consciousness about their relative reputation concerns".

*Philippas and Fotini* (2011) examined "the herding behavior in markets of four undermined European PIGS (Portuguese, Italy, Greece and Spain). They used traditional Cross-Sectional Standard Deviation (CSSD) and Cross-Sectional Absolute Deviation (CSAD) methods to check



the existence of the herding behavior in these markets and recommended that all four markets had the noteworthy herding in trading. Further, they also equated the relation amongst these markets and originate that the herding forces occur among the markets which lead concurrently herding in these markets; they also originate that herding is most likely to occur in extreme market conditions either in lower tail or upper tail”.

*Singh and Paulo*, (2011) compared the Chinese and Indian stock markets with reference to existence of herding behavior. They applied CSSD and CSAD method and start different herding patterns in both markets. “Herding in Chinese market was more likely to happen in bad situations of the market with bigger size of contract, whereas in Indian market it triumphed in high market. However, Chinese market had higher propensity of investor’s herding choices as associated to Indian stock market”. They further explained that the herding in Chinese market was prejudiced by the financial disasters; it required severe governing strategies and rules. On the other hand, Indian market was helped by the large financial foundations which transported more rational security examination dipping the herding behavior in Indian market. Finally, they settled that “herding in dissimilar markets differs in its Mother Nature due to the different guidelines and instruction and different features of both stock markets”.

*Wohar and Bartosz* (2013) analyzed herding behavior using the panel of over thirty two countries including both developed and developing countries. For their analysis, they used the closing values of market indices both at national level and sector level. They applied cross-sectional dispersion as well as sector wise data for checking the existence of herding behavior in each sector. “By using Cross-sectional Standard Deviation (CSSD) and Cross-Sectional Absolute

Deviation (CSAD), they found no evidence of international herding; however, they found significant evidences of herding within the sectors, especially in basic materials, consumer services and oil and gas stocks world-wide. Further, they suggested the newly evolved sectors have relatively higher informational cascades that lead prevalence of herding in such sectors”.

*Ferreira and Konstantinos* (2013) checked industry wise institutional herding to determine whether the herding is ‘intentional’ or ‘coincidental’. They used data of Spanish mutual funds and portfolios, and applied *Sias* (2004) method. “They found significant institutional herding at industry level and also found that the volume of herding is different across industries. Industry with higher information cascade had higher level of herding and vice versa”. Furthermore, they decided that the herding is deliberately at both national and industry level.

*Klein* (2013) research revolves around U.S and Euro-area markets. He detected herding in the markets and also the herding changed during different phases of the markets i.e. market turmoil and tranquil situations. He applied conventional CSSD and CSAD methods along with Markov Switching Seemingly Unrelated Regression (MSSUR) model for finding volatility among different market regimes. Klein found significant herding behavior along with the presence of volatility across the markets.

“Both, the Cross-Sectional standard deviation (CSSD) and Cross-Sectional Absolute Deviation (CSAD) methods showed that herding behavior does not prevail in Karachi Stock Exchange in normal market conditions. However in extreme bearish conditions investors minutely copied others. Although this existence of herding behavior does not backed by the significant statistical results but as compare to other market conditions it has more tendency to occur *Hafeez and Tariq* (2013). In their study, authors used the data of stock returns on monthly basis of KSE 100 index”

“Expectations of the investors about the future movements of the stock markets are influenced by the beliefs of the other investors. Investors normally form their expectations in line with the market consensus” *Schrimpf and Jesper* (2013). They used micro-level panel data of 360 markets and financial experts with a rich combination of socio-economic information. Considering the qualitative aspect of data, “they used ordered choice models. They found that the young investors and the investors which were paid against their performance had more tendencies to get influenced from the market consensus. Going forward they also put light on the factors which could possibly cause this kind of behavior”.

*Lin and Anchor* (2014) analyzed TSE (Taiwan’s Stock Exchange) by categorizing, “the herding measures into two foremost gatherings i.e. information-related herding trials and event-based herding measures. Information-related measures were further classified into direction herding measure, factor deviation herding measure and feedback herding measure. While the later one was further classified into CSSD deviation herding measure, BSD trade herding measure and CSAD herding measure. In first category author initiate important indication of herding by the foreign, domestic certified and local individual stockholders, where further than fifty out of a hundred of the investors were convoluted in similar way of trading, both in purchasing and retailing of pillories. In computing factor unconventionality, again strong indication of herding was originated as echoed by the statement that grasped beta was different from the CAPM created beta. Furthermore the outcomes were also reliable with mutual confidence that herding most possibly succeed in extreme market situations. Additional they establish that herding is fewer critical in minor size sets whereas the contrary is true for big size portfolios”.

*Zheng* (2010) Buy and Sell Difference (BSD) was calculated as the difference between portfolios with positive net sales and portfolios with positive net purchases divided by the total number of stocks. Through this way, authors found that investment behavior of investors differ from each other. The small scale investors were less evident in BSD herding. On the contrary, the reverse was true for the institutional investors and for those having the power to sell in extreme lower market conditions and purchase in extreme high market conditions.

*Pereiraba and Elisabete* (2014) calculated the effect of investor's reaction in investment decisions and its influence on herding behavior. They discovered that market sentiments negatively affected the herding behavior by using regression analysis and Granger causality test. "The flow of causality was from sentiments to herding but it only existed in the neutral market conditions. So, at aggregate level, the hypothesis that market sentiments have influence on herding behavior was rejected. These results are also in line with the findings of *Leite* (2011)".

*Lee and Shih* (2012) conducted study on "Pacific Basin markets". They used granger causality test for three-day, four-day and five-day stock returns, and also built new dummy variables for rise (drop) in US stock market. "The major market under consideration was the U.S stock market and they found that U.S market have crucial role in Pacific Basin region. The Pacific Basin markets had significance evidence of herding towards the U.S stock market, even though the U.S market faced 9/11 and Asian financial crises. This fact also reflected the formidability of U.S stock market. Further, they found structural break in Taiwan's Stock exchange after 9/11 incidence and in Hong Kong market during the Asian financial crises, whereas the U.S market

specially Dow-Jones market did not undergo any structural break demonstrating the potentiality of the U.S stock markets”.

Studies on IPO aftermarket showed that private placement category, negative and insignificant coefficients of  $\beta_1$  and  $\beta_2$  were reported for Consumer Product and Technology sectors respectively. “The negative coefficients were not limited to the down market, with risky and uncertain shares, the results could be an indication of the herding of informed investors in the two mentioned sectors” *Zam et al (2014)*.

*Jiang et al (2012)* initiate that “herding behavior, which is endowing in packed stocks thru a precise age, would drive the mark stocks’ return miserable or active. Expending both formal and separate investors’ intraday swap data to compute the degree of day-to-day herding, they establish that a zero-cost capitalizing approach of ordering long and in height and vending short and tall is profit- able. The incomes added deliberately through herding by separate investors were better than those received by official investors. This intended that formal investors reproduced the info quickly and, even though they did act as a mob, it was tougher to feat the herding of recognized investors to brand strategically grown profits”.

When herding result was examined by *Costa and Almeida (2012)* for a diversity of different market situations, it was originate that Chile display herding behavior during eras of price rise, ages of high trading capacities and during both tall and little instability. The United States showed herding during low trade volume ages. Argentina and Mexico displayed such behavior

during stumpy market instability. No bad and statistically noteworthy coefficients were perceived for Brazil.

Using CSSD and CSAD models arranged by *Christi and Huang (1995) and Khorana and Chang (2000)* individually, *Hsu and Lee (2015)* originate that herding behavior constantly showed in different quantiles during changed market conditions.

*Ahsan (2013)* investigated herding behavior in Dhaka stock exchange (Bangladesh). He found no evidence of herding in Dhaka Stock Exchange for the time period of Jan 2005 through Dec 2011. “Absence of herding in Bangladesh depicts that investors in DSE are rational and make investment decisions based on information available in the marketplace rather than following the market consensus”.

*Philippas (2010)* examined herd behavior in dangerous market situations, reality of asymmetric herding behavior related with market yields, trading size, and return unpredictability. *Nelling and Chiang (2011)* inspected, “investor herding behavior in Pacific-Basin equity marketplaces and create that herding is current in both increasing and dwindling markets. Prominently, the equal of herding is time-varying. They also surprise that herding was definitely related to stock returns, but negatively related to market volatility. Herding estimates across markets were positively correlated, signifying co-movement of investor behavior in the region”.

## 2.2 Critical analysis of Literature

In literature we have found mixed results on herding behavior. The existence, rationality, origins and dimensions of the herding behavior in all major markets of the world is ought to have somewhat same and different theorizing, mathematical and econometrical approach. The detection of herding behavior and its measurements can be classified into two major categorize. The very first is based on dispersion between market and individual portfolio returns that includes CSAD and CSSD. Second deals with the buying and selling of stock behaviors of investors for specific period and market. Informational cascade models are also estimated by different researchers to predict and analyze the behavior of investors in stock markets.

The stock markets can be divided into three different stages, on the basis of volume of stock traded i.e. extreme higher stage, extreme lower stage and the normal market stage. "If the investors are buying more and more and the market has bullish trend" then it is extreme higher stage of the market, whereas reverse of it is considered as the bearish market and treated as extreme lower stage of the market. "If the trading is neither bullish nor bearish" then it is taken as normal market stage. "The cut-off points for extreme higher and lower conditions are different in different studies e.g. five percent higher values are treated as high extreme and five percent lower values are considered as lower extreme by Khorana and Chang (2000) and Christi and Huang (1995), whereas one and five percent lower and higher values are considered as extreme values" by Pereiraba and Elisabete ( 2014). Therefore, it can be concluded that the break points of higher and lower extreme are based upon the structure, volatility and the volume of the concerned market, and this finding is also supported by available literature.

While markets face herding behavior, the standard asset pricing models (CAPM) are neglected that create artificial hype in the market leading markets to ultimate destabilization. So, in this

context herding is not rational and hazardous for markets. While considering agent principle models, the fund managers herd in the market that increases their reputation. But this mimicry of investment also eradicates the expected profit which can be earned by making rational decisions.

### **2.3 Concluding remarks**

When examining a mass of literature about the presence and methods to detect herding behavior, it is suggested that herding behavior is different in developed markets and emerging markets. In developing markets it has high tendency to exist whereas it is less prevalent in developed markets. Furthermore, herding also different during different stages of the market in extreme higher and lower tails of the market as compare to normal market circumstances. Different techniques can suggest different results about the presence of herding. Herding is criticized for creating volatility, destabilization and artificial hype in the market due to ignoring CAPM.



## Chapter 3

### Data and Methodology

This chapter discusses the methodology and data used for analysis of herding behavior at Karachi Stock Exchange.

#### 3.1 Methodological Framework

Herding behaviors in the stock markets have been valued through different valuation methods by different writers i.e. Sias (2004) identified herding by the ratio of vending and purchasing of stocks over the whole traded stock. Christi and Huang, (1995) used CSSD and *Khorana and Chang* (2000) extend this study and used CSAD technique to detect herding behavior in main stock markets of the world i.e. "USA, Japan, Hong Kong, Korea and Taiwan". In many of the existing literature the CSSD and CSAD methods are used to detect the herding phenomena of the stock markets i.e. *Khorana and Chang* (2000) *Tan and Nelling* (2008) *Singh and Paulo* (2011) *Kutan and Riza* (2006) *Hafeez and Tariq* (2013) etc. They originate that both of the approaches CSSD and CSAD can offer different outcomes about the presence of herding, although using on same market for the similar time period data set. They all supported the consistency of CSAD over the CSSD. In this research, both techniques i.e. the CSSD and CSAD are utilized in order to test either herding phenomena occur in Karachi Stock Exchange (KSE) or not.

### 3.2 Equally Weighted Average return

The give and take of stocks greatly rely on the average returns of that specific stock and the average market return, and in this investigation and evaluation of CSSD and CSAD also built on the average returns of the market and the average returns of the specific sectors. So, In this evaluation equally weighted average returns of the KSE and leading sectors valued from the daily stock prices with the following formula

$$R_{it}=100\times\{\log(P_{it})-\log(P_{it-1})\} \quad 3.1$$

$R_{it}$  Shows return for  $i$ th firm or company at time period  $T$ ,  $P_{it}$  shows the natural log of the stock price for the  $i$ th firm or company at time period  $T$  and  $\log(P_{it-1})$  shows natural log of the lagged values of the stock prices of the companies. By applying returns of the companies the equally weighted average return is calculated for selected sectors and for the (KSE).

### 3.3 Cross-Sectional Absolute Deviation

This model is an expansion of *Christi and Huang* (1995) CSSD model and both are the estimates to detect herding for sectors and market. *Christi and Huang* (1995) consider the stress market conditions and inspected that in upper and lower tails stakeholders are more probably to restraint their own analysis. They covered both high and low tails by inserting dummy variables for both. *Khorana and Chang* (2000) go further ahead and argued that herding can prevail not only in stress circumstances but in normal market circumstances as well. They demonstrated in their study that the “rational asset pricing models” predicted that “the individual and average

market return dispersion is not only the increasing function instead they are linearly increasing function" *Black* (1972). For catching the herding in the market they introduced the square of market return as a dependent variable, and the following equation is given as

$$CSAD_t = \frac{1}{N} \sum_{i=1}^N |R_{i,t} - R_{m,t}| \quad 3.2$$

Here  $CSAD_t$  shows the cross-sectional absolute deviation at time  $t$ ,  $R_{i,t}$  and  $R_{m,t}$  are the return of company  $I$  at time  $t$  and the average market return of the market at time  $t$ . *Khorana and Chang* (2000) also specified two separate equations for the "upper and lower extremes" of the market. This study analyzes the general equation and then move towards the equations stated for catching the herding behavior of the financiers during different stages of the stock markets.

$$CSAD_t = \beta_0 + \beta_1 R_{m,t} + \beta_2 R_{m,t}^2 + \varepsilon_t \quad 3.3$$

Above equation is designed to detect the effect of non-linearity between individual and average market return dispersal, the negatively significant  $\beta_2$  represents the presence of the herding phenomena in the specific market. The result of stakeholder's behavior in different stages of the market can also be detected by presenting an additional  $R_{m,t}$  in the right portion of the equation 3.3. The following equation 3.4 represents the specifications of the model which captured the non-linearity in dispersion along with the behavior of investors in different market phases:

$$CSAD_t = \beta_0 + \beta_1 R_{m,t} + \beta_2 |R_{m,t}| + \beta_3 R_{m,t}^2 + \varepsilon_t \quad 3.4$$

To capture the behavior of the investors in the lower and upper extreme of the market, two more equations are valued which only examine the values of the market returns lying out of the well-defined boundary for both the higher and lower sides:

$$CSAD_t^{UP} = \beta_0 + \beta_1^{UP} |R_{m,t}^{UP}| + \beta_2^{UP} (R_{m,t}^{UP})^2 + \varepsilon_t \quad 3.5$$

$$CSAD_t^{DOWN} = \beta_0 + \beta_1^{DOWN} |R_{m,t}^{DOWN}| + \beta_2^{DOWN} (R_{m,t}^{DOWN})^2 + \varepsilon_t \quad 3.6$$

In equation 3.5 and 3.6 the  $\beta_2$  captures the effect of extreme lower and extreme higher market conditions, where if the sign positively significant which leads the existence of CAPM model assumption i.e. diffusion in individual return have linear relationship with the diffusion in average return of the market. If the negatively significant  $\beta_2$  is obtained it represents the presence of the herding behavior in the particular phases of the particular equity market.

### 3.4 Cross-Sectional Standard Deviation

CSSD technique was presented by the *Christi and Huang* (1995) while they were observing the herding in USA equity markets. They applied the relation between CSSD of individual returns and the variation in average market returns, to find herding in USA equity markets. CAPM advocates that “the dispersion in individual returns have linear relation with the dispersion of average market returns, as the average market return increases as the dispersion in individual portfolio return increases almost with the same coefficient” Black (1972) Mazuy et al, (1966). Additional they also establish that the relation between individual and market returns were also moved by the market circumstances, i.e. in higher and the lower extreme of the market because of high stress on the stakeholders more expected to suppress their own analysis and follow the others. The *Christi and Huang* (1995) state the CSSD as:

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^N (R_{i,t} - R_{m,t})^2}{N-1}} \quad 3.7$$

Where  $N$  is the total no of companies,  $R_{i,t}$  represents return of  $i$ th firm at  $t$  time, while the  $R_{m,t}$  shows market return at  $t$  time. *Christi and Huang* (1995) predicted that the portfolio of individual returns has the linear relationship with the average market returns. If this relationship is not linear it shows the presence of the herding in that specific market.

*Christi and Huang*, (1995) extended their work and treated stress market conditions in different way. They consider that in extreme conditions stakeholders normally falter to follow their own analysis. So, the herding has chances to occur. They introduce dummies for each lower extreme and higher extreme it depends upon the market composition. In some circumstances, it observe top 5% and bottom 5% values as the higher and lower extreme separately *Christi and Huang* (1995) *Khorana and Change* (2000).

$D_t^L = 1$  If the returns of market lie on the bottom 5% of the spreading of the return, zero otherwise.

$D_t^U = 1$  If the returns of market lie on the top 5% of the spreading of the return, zero otherwise.

Regression equation will be as follows:

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t \quad 3.8$$

$\beta^L$  Is the sensitiveness of lower extreme and the  $\beta^U$  is the volume of sensitiveness of stakeholder behavior in upper extreme of the market returns. Negative and significant sign for  $\beta,s$  represents the presence of herding behavior in the specific market and the positive sign for  $\beta,s$  shows no existence of herding behavior.

Herding is more likely to occur during the phase of large movements in the markets, to capture the behavior of the investors in these phases of the market i.e. the lower and upper extreme of the market, this study expanded by introducing a dummy variable. The following equation proposed by Zheng, (2010) will be estimated which only consider the values of the market returns, which lies outside the defined circle, both for the higher and lower side.

$$CSAD_t = \beta_0 + \beta_1(d)R_{m,t} + \beta_2(1-d)R_{m,t} + \beta_3(d)R_{m,t}^2 + \beta_4(1-d)R_{m,t}^2 + \epsilon_t \quad 3.9$$

Where, D represent dummy variable takes value one if the return is positive otherwise it will be equal to zero. The statistically significant and negative  $\beta_3$  will represent the existence of herding in the lower market condition, whereas the negatively significant  $\beta_4$  will provide evidence of herding in higher extreme of the market.

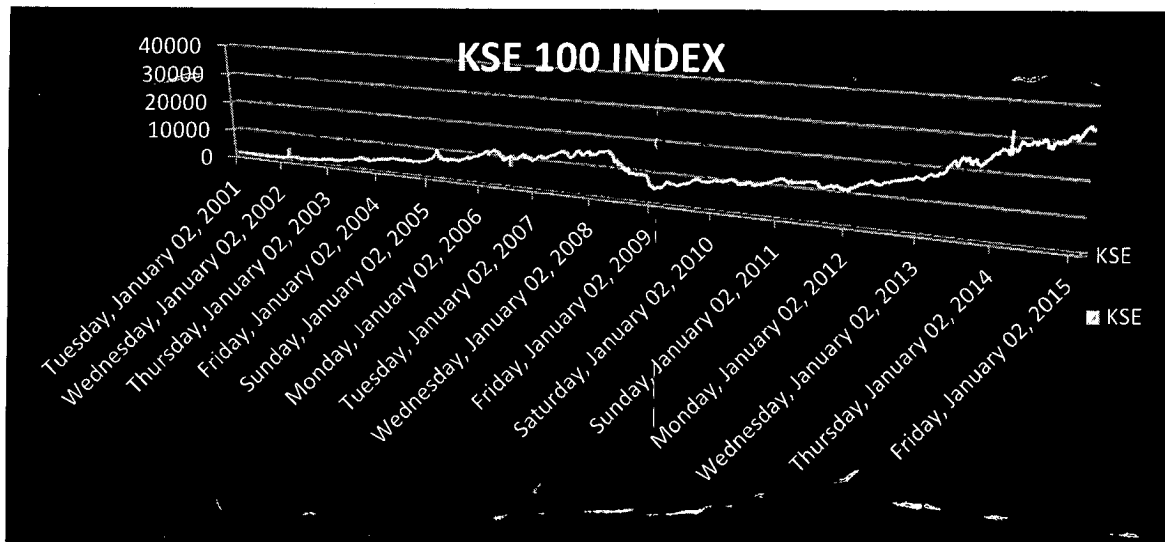
This study tests the presence of the herding behavior in the KSE as well as in its leading sectors e.g. textile, textile spinning, commercial banks, investment banks, and chemical, power generation and distribution, close end mutual funds, refinery, cable and electrical goods, oil and gas marketing, cement, insurance, sugar and allied industries, paper and board, pharmaceuticals, engineering, food and personal care products etc.

### **3.5 Data**

As this analysis deals with the Karachi Stock Exchange (KSE) and its leading sectors, so the data comprises of the daily stock prices of the listed, active and traded stocks in KSE. The data of daily stock prices is gathered for sectors of the KSE included, textile, textile spinning, commercial banks, investment banks, and chemical, power generation and distribution, close end mutual funds, refinery, cable and electrical goods, oil and gas marketing, cement, insurance, sugar and allied Industries, paper and board, pharmaceuticals, engineering, food and personal care products etc. The source of the data is the Daily Business Recorder, and the sectors are decided on the basis of turnover ratios of their stocks in KSE stock trading and the availability of the data set.

#### **3.5.1 Karachi Stock Exchange (KSE)**

The KSE 100 Index is a most important stock market which tracks the enactment of major companies by market capitalization from each sector of Pakistani economy listed on KSE. Since October 15th, 2012 it is a autonomous index. Due to progress and enlargement in volume of the trading KSE is considered as one of the developing stock markets, given below diagram clarifies the growth path of KSE from January 2001 to July 2015.



KSE has pass through tough times during the period of under attention.

Pakistan has pass through tight economic agreements due to the atomic explosion, terrorist attacks lack of continuity in policies due to ups and downs in political stability. These commendations generate instability in overall economic performance of the Pakistan. This ambiguity and instability in Pakistan economy clues substantial outflow of the capital from domestic market to international markets which eventually ended with the 16 to 20 % reduction in the volume of KSE-100 index. In Pervez Musharraf government KSE once again started to enlarge its volume, particularly large investment in telecommunication and commercialization of media was fairly useful to PAK economy to recover stability and development process.

The KSE-100 index began to improve progressively from 5,634 in 2008 to progressive increase towards the land mark of 20,000 in 2013. The achievement of KSE to its territorial pairs drives the stock exchange to beyond 30,000 in 2014. The nonstop and continuous inflows from abroad drive the index nearly 36,700 in July 2015.



Collected all companies prices listed in KSE to calculate market average return, and then Calculate CSAD for the equation 3.3 and 3.5 to check herding behavior in normal conditions as well as for the bullish and bearish conditions and CSSD for equation 3.7 to find either herding behavior exist in stress condition or not for Karachi stock exchange (KSE).

## Chapter 4

### 4.1 Graphical Analysis between CSAD and RMT

This chapter comprises of graphical analysis of the average market returns and individual stock's spreads. Nevertheless graphical analysis gives enough information to detect about the non-linearity in KSE and its leading sectors, which ultimately leads to herding. Nevertheless this graphical analysis is not as accurate as the empirical analysis. So, to make it more crystal clear and accurate the analysis is extended to empirically check the existence of herding behavior.

If the graphs display linear increasing link between market returns and individual stocks diffusion shows the presence of herding in that specific sector and market *Cheng and Khorana* (2000). Below given graphs represents the relationship between cross sectional absolute deviation and **Rmt** for the KSE and each sector.

Fig 4.1: CSAD &  $R_{mt}$  of cable and electrical goods

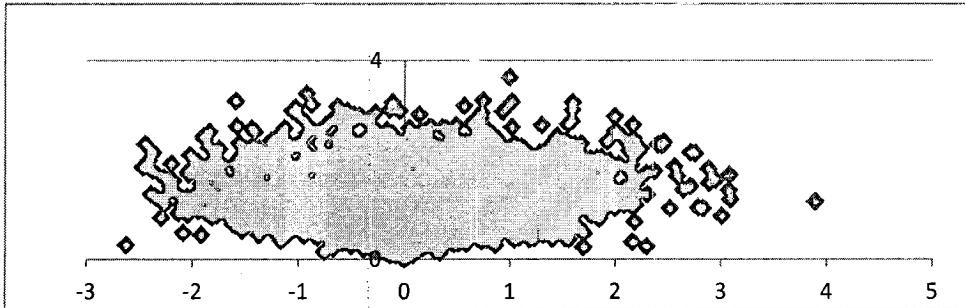


Fig 4.2: CSAD &  $R_{mt}$  of cement

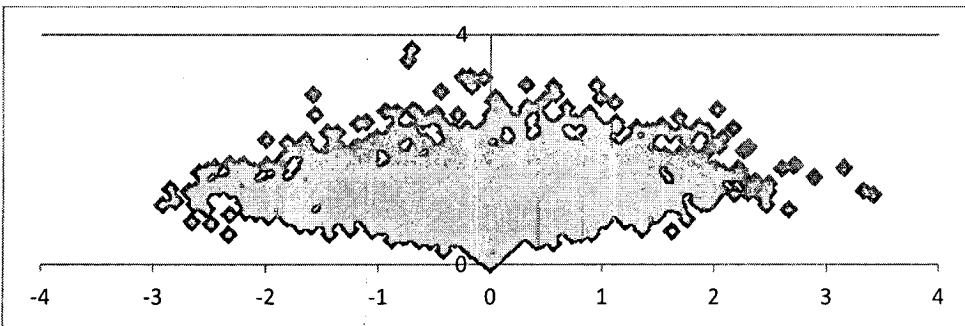


Fig 4.3: CSAD &  $R_{mt}$  of close end mutual funds

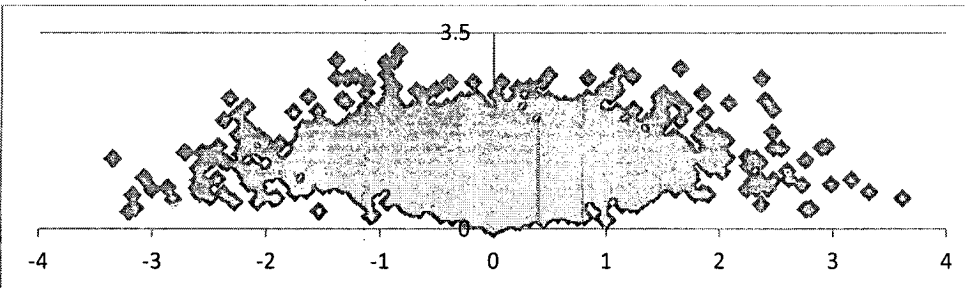


Fig 4.4: CSAD &  $R_{mt}$  of Engineering

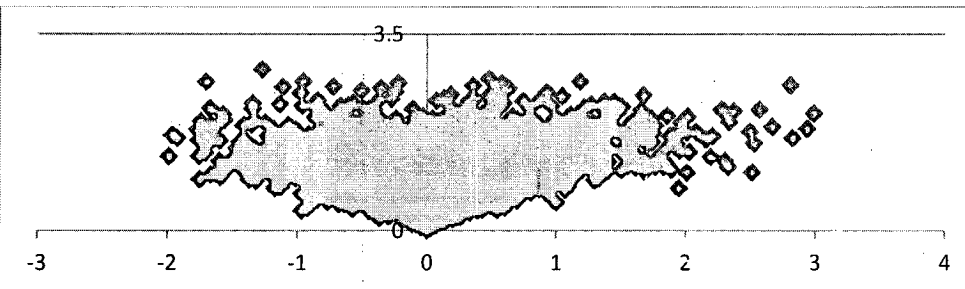


Fig 4.5: CSAD &  $Rmt$  of Food and personal care products

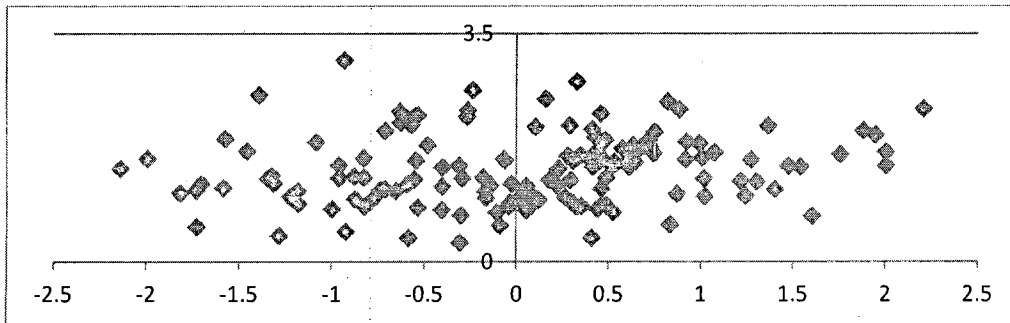


Fig 4.6: CSAD &  $Rmt$  of Glass and ceramics

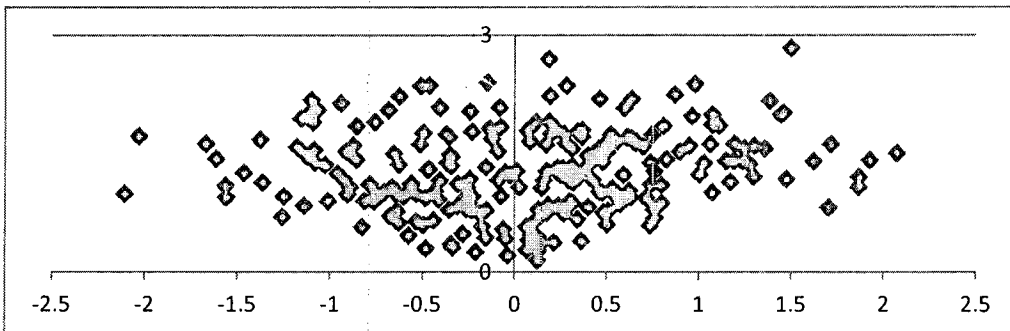


Fig 4.7: CSAD &  $Rmt$  of Insurance

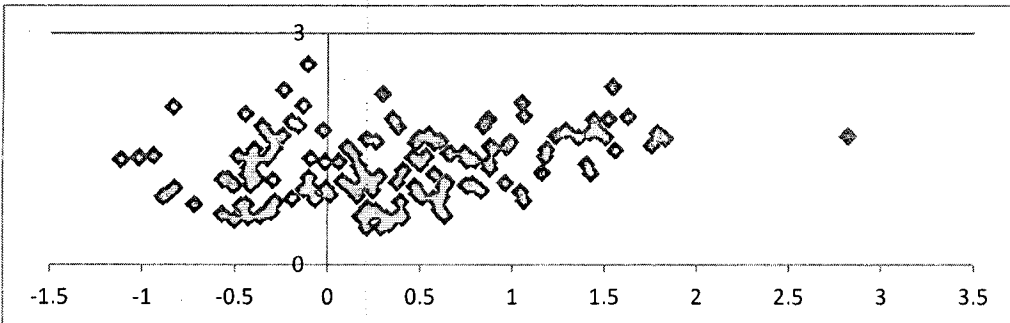


Fig 4.8: CSAD &  $Rmt$  of Investment banks

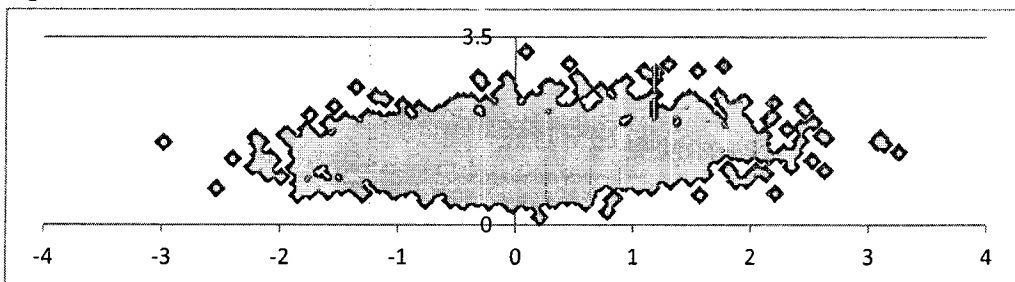


Fig 4.9: CSAD & *Rmt* of Jute

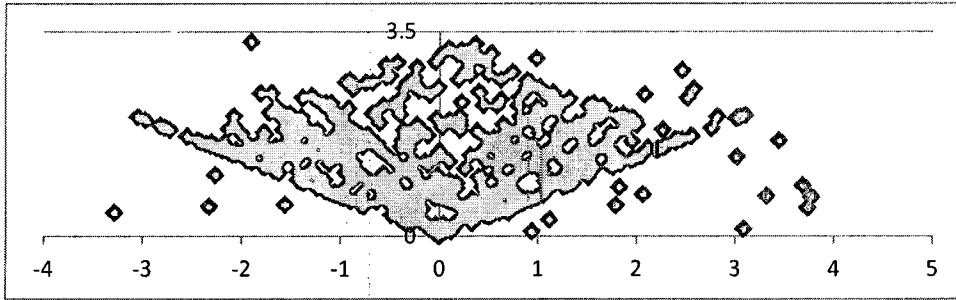


Fig 4.10: CSAD & *Rmt* of Leasing

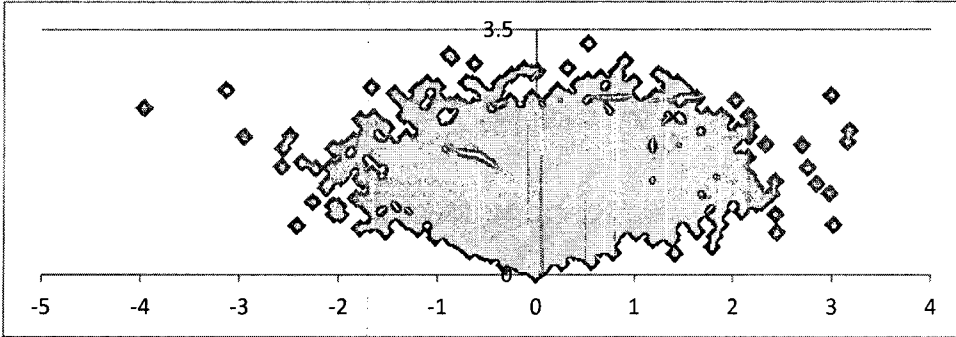


Fig 4.11: CSAD & *Rmt* of Lather and tanneries

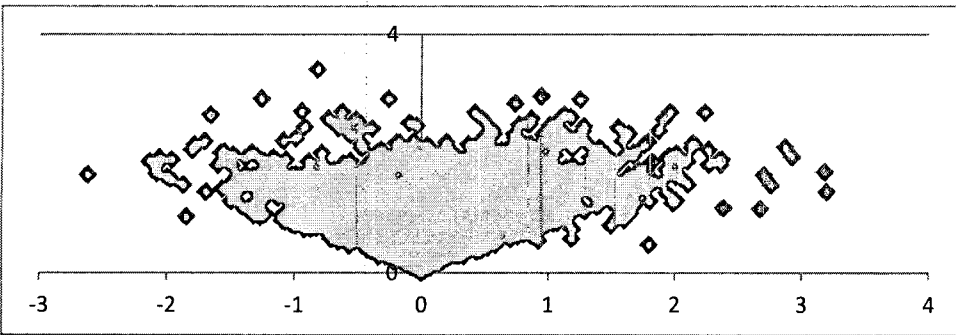


Fig 4.12: CSAD & *Rmt* of Paper and board

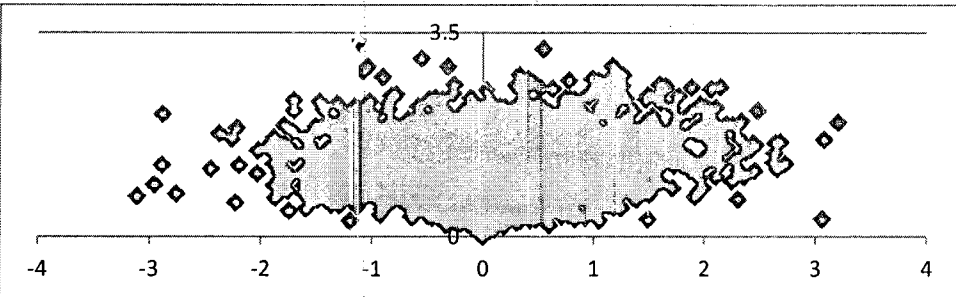


Fig 4.13: CSAD & *Rmt* of Pharmaceuticals

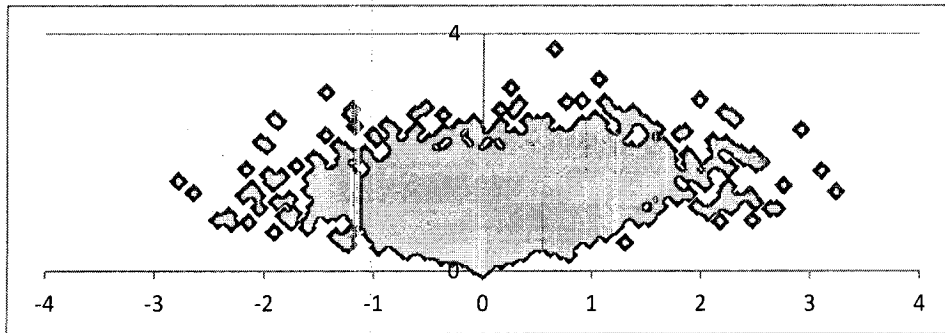


Fig 4.14: CSAD & *Rmt* of Refinery

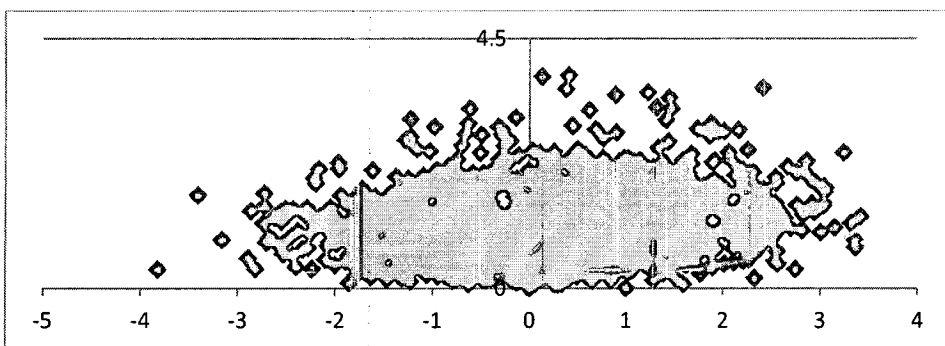


Fig 4.15: CSAD & *Rmt* of Sugar and allied industries

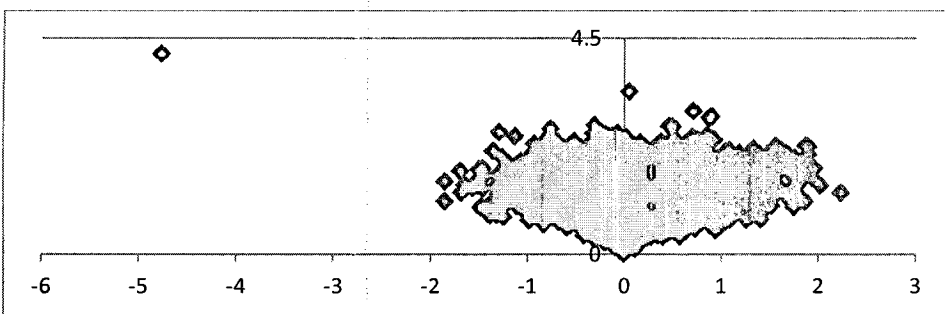


Fig 4.16: CSAD & *Rmt* of Synthetic and rayon

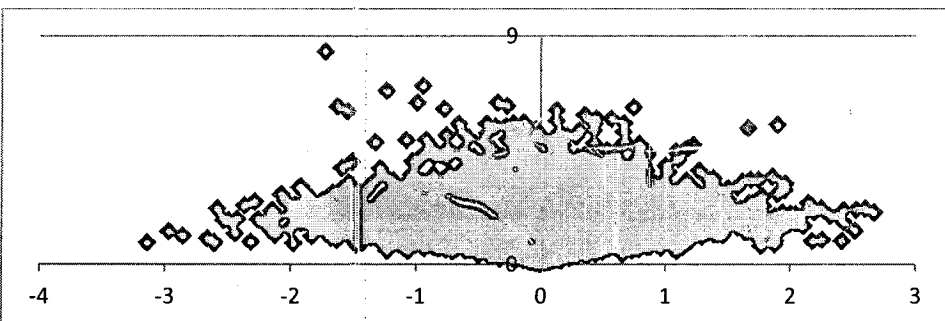


Fig 4.17: CSAD & *Rmt* of Tobacco

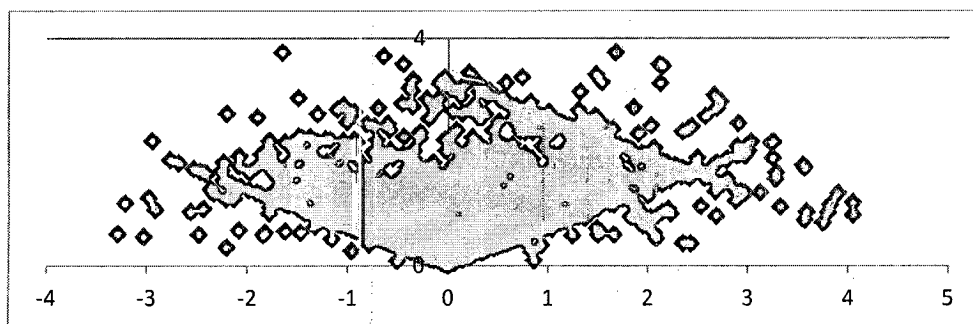


Fig 4.18: CSAD & *Rmt* of Textile Spinning

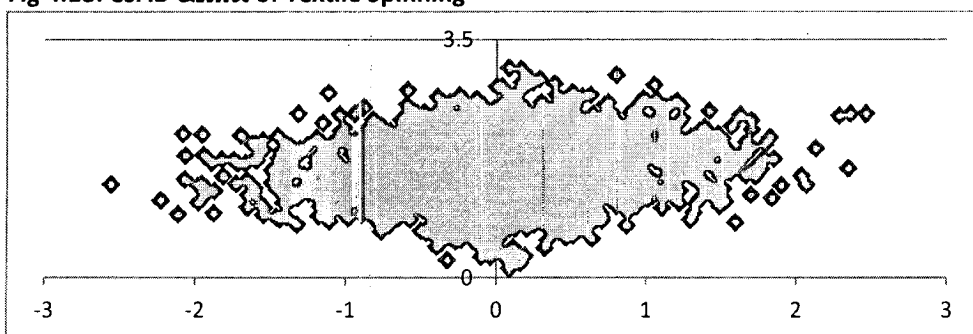


Fig 4.19: CSAD & *Rmt* of Textile

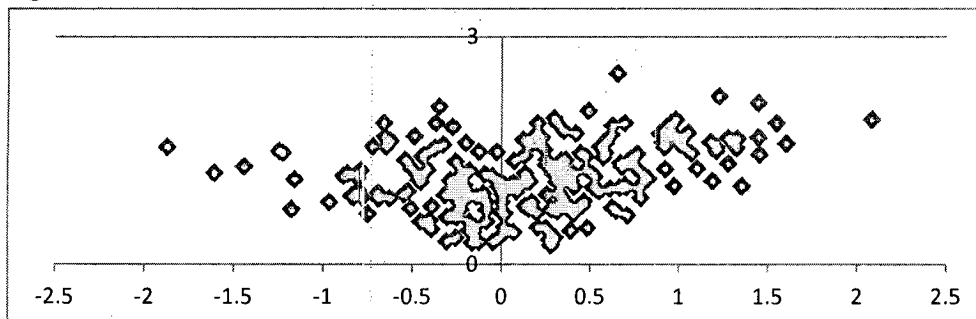


Fig 4.20: CSAD & *Rmt* of Transport

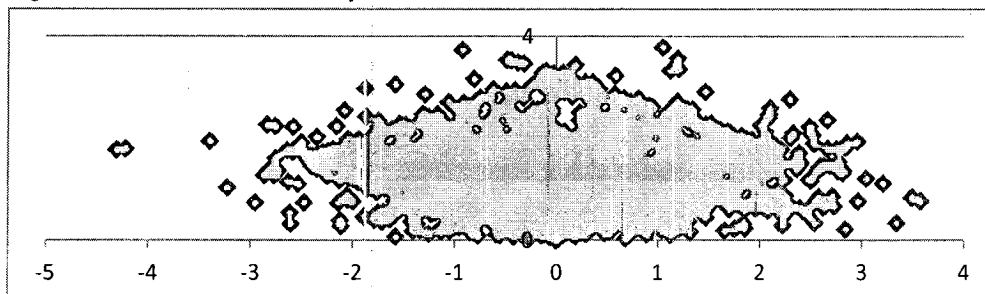


Fig 4.21: CSAD &  $Rmt$  of Modarbas

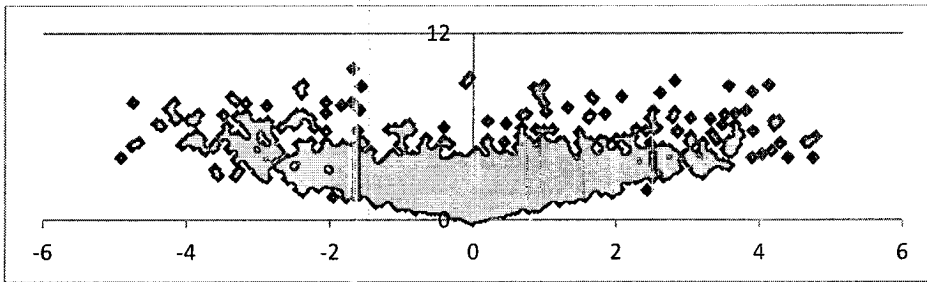


Fig 4.22: CSAD &  $Rmt$  of Automobiles

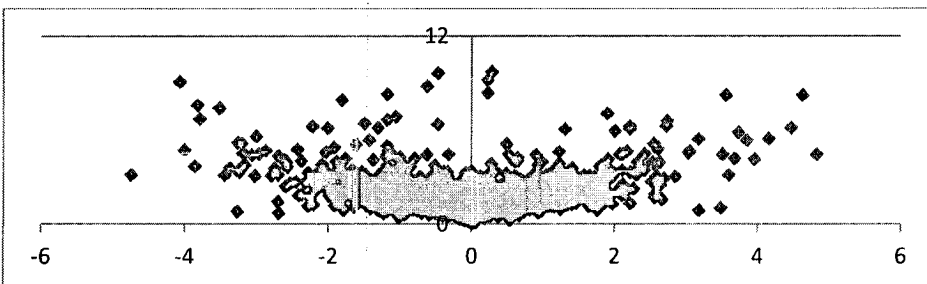


Fig 4.23: CSAD &  $Rmt$  of Commercial banks

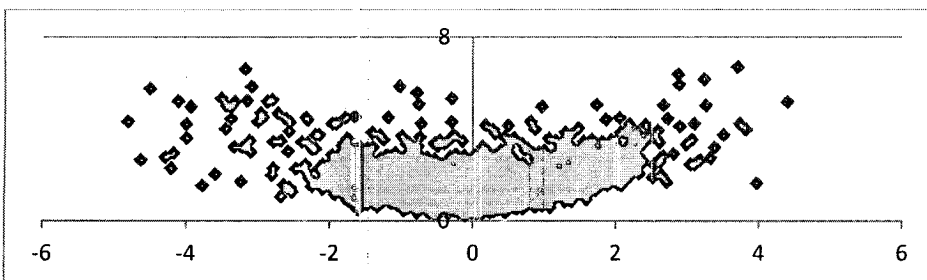


Fig 4.24: CSAD &  $Rmt$  of Chemicals

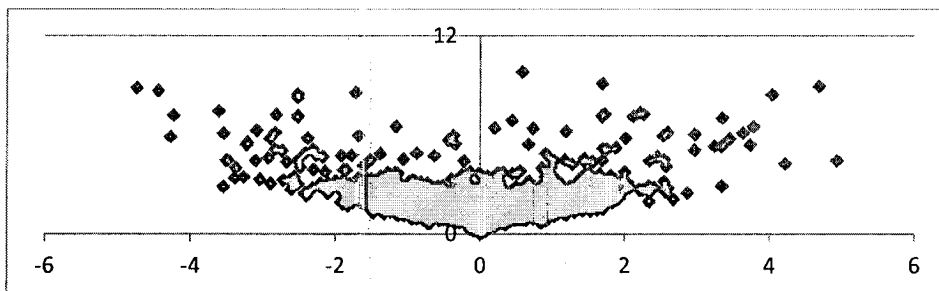




Fig 4.25: CSAD &  $Rmt$  of Power generation and distribution

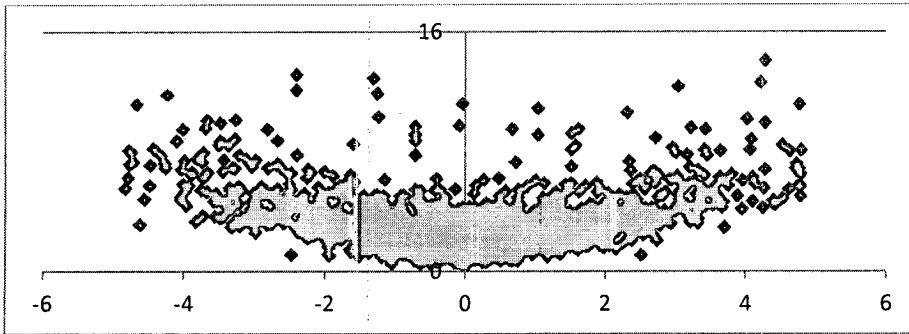


Fig 4.26: CSAD &  $Rmt$  of Health

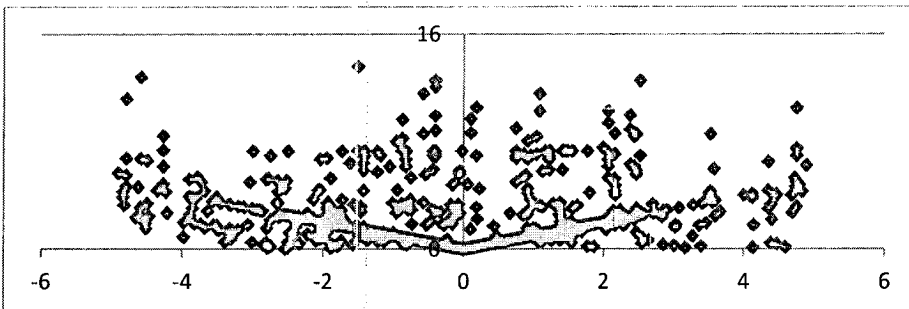


Fig 4.27: CSAD &  $Rmt$  of Oil and gas exploration

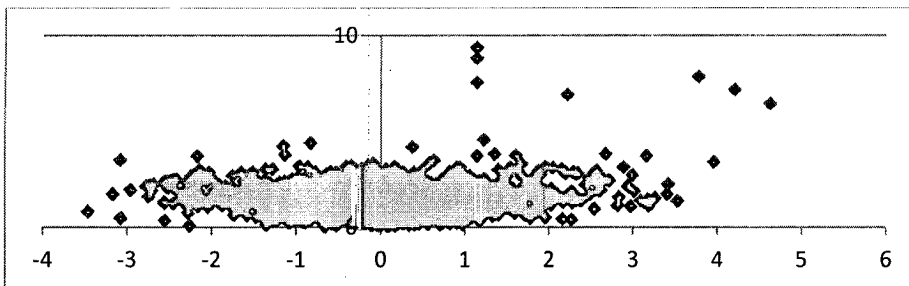


Fig 4.28: CSAD &  $Rmt$  of Oil and gas marketing

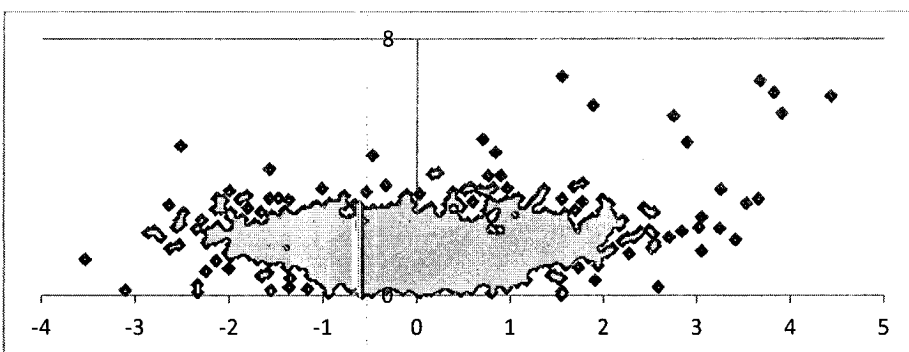
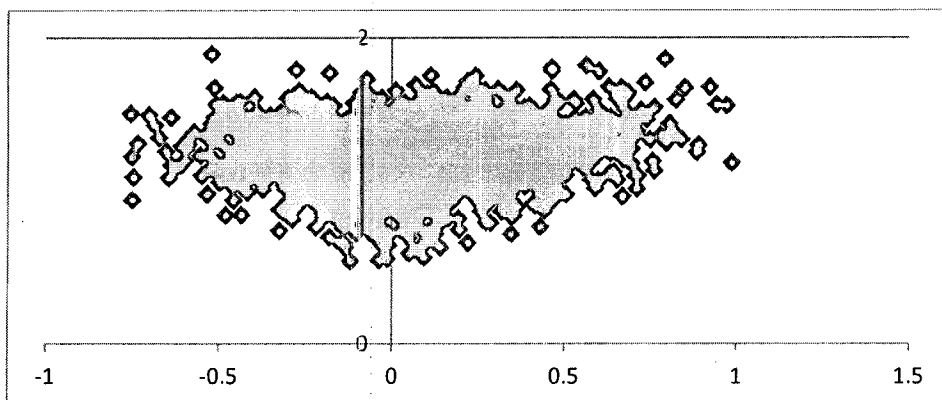


Fig 4.29: CSAD &  $R_{mt}$  of KSE



The relation between CSAD and  $R_{mt}$  somehow display the image of presence or non-presence of herding behavior in KSE and its leading sectors. CAPM suggest that “the  $R_{mt}$  and CSAD have increasing relationship, as the returns of the market increased the individual stock dispersion also increased” Chang (2000). If this is not exist in specific market and stakeholders flow with the stream and make choices built on the aggregate market suggestions. Then the spread is not linear and increasing. The diagrams with non-linear relationship show occurrence of herding in specific sector while, the linearity of diagrams depicts that the non-existence of herding behavior in specific sector.

## **4.2 Concluding remarks**

Graphical analysis depicts that in KSE there exist no evidence for herding but most of the sectors there exist herding phenomena except investment banks, leasing, paper and board, refinery, sugar and allied industries, transport, textile spinning, oil and gas exploration and oil and gas marketing. Although graphical analysis of the data depicts the close picture of the actual market dynamics but these are not as reliable as the empirical estimation is, so, this study also extended to empirical analysis of herding behavior occurrence and the next chapter comprises the process of empirical estimation. This non-linearly increasing or even decreasing relationship between market returns and dispersion of the individual stocks represents the existence of herding in that particular market Khorana and Change (2000).

## Chapter 5

### Empirical Findings and Discussion

This chapter presents the empirical results and their interpretations.

#### 5.1 Estimation of herding behavior in Normal market condition

This model introduced by Chang et al (2000) because Christi and Huang (1995) introduces the model known as Cross Sectional standard deviation (CSSD) to be used only in scenario of abnormal conditions (Stressed conditions), Khorana and Change (2000) extended his work and introduces a new model known as cross CSAD to detect herding behavior in normal situations which is as follows

$$CSAD_t = \beta_0 + \beta_1 R_{m,t} + \beta_2 |R_{m,t}| + \beta_3 R_{m,t}^2 + \varepsilon_t \quad 5.1$$

The negatively significant  $\beta_3$  represents the prevalence of the herding behavior in the Specific sector and market. We did this for each sector separately. The given table comprises the Results of all sectors including KSE built on the equation 5.1 which evaluate relationship between individual return dispersions and market returns.

**(Table no 5.1). Herding behavior in "Normal market conditions":**

Sectors	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$R^2$
Cable and Electronic goods	.9630097*** (.029736)	.0225193* (.01386)	.480094*** (.063985)	-.101814*** (.028374)	0.0710
Cement	1.0568*** (.022996)	.053462*** (.01182)	.4194322*** (.053139)	-.112625*** (.0238732)	0.0634
Close end Mutual funds	.873719*** (.025276)	-.0151692*** (.0119752)	.6032302*** (.052704)	-.202394*** (.0220048)	0.0654
Engineering	.7763353*** (.02131)	.0640316*** (.0144246)	.7579565*** (.056839)	-.17511*** (.030432)	0.2013
Food and personal care	.9463198*** (.02315)	.1025796*** (.0143485)	.653006*** (.05233)	-.135102*** (.0233686)	0.1685

products					
Glass and ceramics	.99934*** (.025423)	.03239*** (.013316)	.586719*** (.060974)	-.164658*** (.0292125)	0.0883
Insurance	1.058421*** (.01857)	.0494907*** (.015607)	.391784*** (.063481)	.0147023* (.0431884)	0.1192
Investment banks	1.20216*** (.020108)	.078177*** (.010665)	.214317*** (.0473896)	-.0493139** (.022793)	0.0533
Jute	.094628*** (.01684)	-.0127285** (.011058)	1.72896*** (.038495)	-.423641*** (.017289)	0.6339
Leasing	1.075168*** (.026234)	.003954* (.014012)	.408634*** (.058841)	-.0870863*** (.0267887)	0.0552
Lather and tanneries	.525309*** (.021093)	.02263* (.0157966)	1.15401*** (.055507)	-.281253*** (.028916)	0.3223
Paper and board	.88198*** (.024641)	.06636*** (.013207)	.586906*** (.0567073)	-.158734*** (.026263)	0.1089
Pharmaceuticals	.721080*** (.0211886)	.081919*** (.0148719)	.788759*** (.0558571)	-.1869206*** (.0273444)	0.2064
Refinery	.748318*** (.027377)	.09667*** (.012079)	.468171*** (.0548086)	-.111336*** (.021234)	0.1020
Sugar and allied industry	1.12513*** (.018736)	-.0143411* (.0153358)	191612*** (.046905)	.069956*** (.0243755)	0.0752
Synthetic and rayon	1.74018*** (.056106)	.04880544* (.0283128)	.312822*** (.133638)	-.119103* (.0645911)	0.0044
Tobacco	.356366*** (.024488)	.109964*** (.0145007)	1.311789*** (.0491686)	-.3248465*** (.0185382)	0.3623
Textile spinning	1.54756*** (.0218133)	.076390*** (.0134536)	.128711** (.0622455)	-.042965** (.0361384)	0.0194
Textile composite	1.19981*** (.02022)	.0659622*** (.015539)	.343386*** (.059311)	-.086154*** (.0348746)	0.0722
Transport	.99917*** (.03186)	-.000522* (.013613)	.39919*** (.061398)	-.09096*** (.023836)	0.0374
Modarbas	1.3086*** (0.0535)	-0.0001 (0.0185)	1.1983*** (0.0816)	-0.0361*** (0.0225)	0.4356
Automobiles	1.0430*** (0.0877)	0.0778 (0.0667)	0.6780*** (0.2121)	0.1845** (0.0878)	0.3768
Commercial Banking	1.0148*** (0.0316)	0.0370** (0.0155)	0.7034* (0.0574)	0.0357*** (0.0182)	0.3991
Chemicals	1.1836*** (0.0331)	0.0209 (0.0193)	0.7895*** (0.0648)	0.1248*** (0.0209)	0.4805

Power generation and distribution	1.9241*** (0.0673)	-0.0488*** (0.0194)	0.6715*** (0.0914)	0.1135*** (0.0229)	0.4128
Health	0.1967*** (0.0610)	0.0249 (0.0262)	1.5413*** (0.0934)	-0.1522*** (0.0242)	0.2989
Oil & Gas Exploration	0.9816*** (0.0344)	0.0291*** (0.0167)	0.3727*** (0.0667)	0.0598** (0.0254)	0.1768
Oil & Gas Marketing	1.2539*** (0.0300)	0.0007 (0.0158)	0.1437** (0.0607)	0.1457*** (0.0240)	0.1793
KSE	1.1966*** (0.00876)	0.021466 (0.015545)	0.09317 (0.06424)	0.18691* (0.09602)	0.4840

Note: The values in the parenthesis below the coefficients are *p values*

(\*) Significant at 10%, (\*\*) Significant at 5%, (\*\*\*) Significant at 1%

$\beta_0$  Shows constant term,  $\beta_1$  is the coefficient of normal value of the average returns of specific sector or KSE,  $\beta_2$  is the coefficient of the absolute values of the average returns, while the  $\beta_3$  is the coefficient of the square of the average returns. The square of the average stocks is built in the model to detect the nonlinear relation between individual return diffusion and *Rmt*. The negative significant  $\beta_3$  exhibits the indication of herding behavior in that specific sector or the Karachi Stock Exchange.

Results shows that in normal situation most of the sectors have significant herding phenomena except insurance, sugar and allied industries, automobiles, commercial banks, chemicals, power generation and distribution, oil and gas exploration and oil and gas marketing. Further most the sectors have herding at 1% of the significant level apart from textile spinning and investment banks have herding at 5% of the significance level, while synthetic and rayon has herding at 10%

of the significance level. *Chang et al (2000)* proposed that emerging economies like Taiwan, South Korea etc. have more tendencies for herding as compared to developed economies. So these outcomes are in line with the findings of *Chang et al (2000)*. Existence of herding behavior may be due to the reason of reputational purposes (agents chase their peer group to keep their status in the market).

## 5.2 Estimation of herding behavior in “stress market conditions”

Stock markets are reflected almost unpredictable and sensible markets of any economy, minor good or minor bad news have huge impacts on the performance and behavior of the stakeholders into the stock market. During the period of stability chances to herd are very low but circumstances of high volatility leads to herding, this scenario the chances of herding in lower extreme of the market are higher than the higher extreme and normal market conditions To estimate herding behavior in stress market conditions *Christi and Huang (1995)* proposed a model known as CSSD which is

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t \quad 5.2$$

$\beta^L$  Is the sensitiveness of lower extreme and the  $\beta^U$  is the volume of sensitiveness of stakeholder behavior in upper extreme of the market returns. Negative and significant sign for  $\beta_s$  represents the presence of herding behavior in the specific market and the positive sign for  $\beta_s$  shows no existence of herding behavior *Christi and Huang (1995)*. We did this for each sector separately.

**Table 5.2. Estimation of herding behavior in stress market conditions**

Name of sector	$\alpha$	$\beta^L$	$\beta^U$	$R^2$
Cable and Electronic Goods	1.701932*** (.0160035)	-1.363342*** (0.0654849)	2.048815*** (0.0104223)	0.2916
Cement	1.637037*** (0.0115856)	-1.406444*** (0.0745989)	1.635769*** (0.0794075)	0.2740
Close End Mutual Funds	1.587797*** (0.0130741)	-1.241979*** (0.0453788)	1.701449*** (0.0709559)	0.3983
Engineering	1.561871*** (0.0130367)	-1.213547*** (0.0540721)	1.634011*** (0.0910702)	0.2925
Food & Personal care Products	1.88133*** (0.0151532)	-1.612975*** (0.0641965)	2.007717*** (0.0948933)	0.3467
Glass & Ceramics	1.72688*** (0.0130721)	-1.474405*** (0.0587202)	1.68217*** (0.0668545)	0.3848
Insurance	1.691318*** (0.0100203)	-1.017649*** (0.0495858)	1.25579*** (0.0642593)	0.2877
Investment Bank	1.897179*** (0.0100126)	1.316636*** (0.0717911)	-1.069849*** (0.0442678)	0.3105
Jute	1.349414*** (0.0179277)	-1.349414*** (0.0396583)	2.279286*** (0.0849253)	0.4974
Leasing	1.721917*** (0.0145542)	-1.356512*** (0.049277)	1.801146*** (0.0742509)	0.4048
Paper & Board	1.587366*** (0.0133913)	-1.274708*** (0.0592571)	1.659688*** (0.078162)	0.3103
Pharmaceuticals	1.417344*** (0.0138217)	-1.365179*** (0.0853272)	1.822073*** (0.0831119)	0.2636
Refinery	1.427138 (0.0140801)	-1.112679*** (0.0404842)	2.094377*** (0.0712252)	0.4516
Sugar & allied Industry	1.713079*** (0.0107511)	-1.195776*** (0.0481275)	1.348105*** (0.0597407)	0.3578
Synthetic Rayon	1.818096*** (0.0138849)	-1.508068*** (0.07959)	1.686538*** (0.0937618)	0.2491
Tobacco	1.549395*** (0.0178734)	-1.411085*** (0.0406579)	2.535281*** (0.0879705)	0.5139
Textile Spinning	2.068897*** (0.0096532)	-1.311402*** (0.061935)	1.13306 (0.0586084)	0.2856
Textile composite	1.809795*** (0.0099868)	-1.222866*** (0.0589107)	1.153677*** (0.0575098)	0.2890



Transport	1.706657*** (0.0162648)	-1.406484*** (0.0531733)	2.322176*** (0.0751435)	0.4566
Modarba	3.6463*** (0.0430)	-3.0569*** (0.1781)	6.8224*** (0.2127)	0.4147
Automobiles	2.1801*** (0.0781)	-1.3472*** (0.3195)	10.7375*** (0.5242)	0.6501
Commercial Banks	2.1286*** (0.0248)	-1.5737*** (0.1453)	4.8551*** (0.1321)	0.4343
Chemical	2.7916*** (0.0309)	-2.0554*** (0.1299)	7.1086*** (0.1756)	0.4998
Power generation and distribution	13.3996*** (0.5216)	-12.147*** (3.1648)	15.8423*** (2.7532)	0.6185
Health	1.7045*** (0.0387)	-1.7045*** (0.0920)	8.1965*** (0.1480)	0.6541
Oil & Gas Exploration	1.2786*** (0.0153)	-1.1051*** (0.0989)	2.2066*** (0.0772)	0.3306
Oil & Gas Marketing	1.9726*** (0.0166)	-1.5023*** (0.0910)	2.2416*** (0.0865)	0.3335
KSE	1.59104*** (0.003065)	-0.43945*** (0.01072)	0.31587*** (.00690)	0.6746

*Note:* The values in the parenthesis below the coefficients are *p values*  
 (\*) Significant at 10%, (\*\*) Significant at 5%, (\*\*\*) Significant at 1%

Estimated results of table 5.2 shows that herding in lower extreme of almost all the sectors is prevailing significantly except one sector i.e. investment banks has no evidence of herding in

lower extreme but has herding in higher extreme at 1% level of significance. Even in Karachi stock exchange(KSE) herding exist in lower extreme at 1% of level of significance. These results are consistent with *Christi and Huang* (1995).

The researchers including Lin and Anchor (2014) Wohar and Bartosz (2013) Tan and Nelling (2008) Philippas and Fotini (2011) analyzed both the Cross Sectional Standard Deviation and Cross Sectional Absolute Deviation techniques in their study in “Taiwan, panel of 32 developing countries, China and PIGS (Portugal, Italy, Greece and Spain” stock markets one by one. They find different outcomes with cross sectional standard deviation (CSSD) and cross sectional absolute deviation (CSAD) in different countries, as found above in case of Karachi Stock Exchange(KSE). The one common thing upon which they all settle with that reliability of Cross Sectional Absolute Deviation technique over the Cross Sectional Standard Deviation. Prevailing of herding behavior in stress market conditions suggests that market is more volatile during the stress period and investors follow adaptive expectation rather than rational expectations which ultimately leads to herding in the market.

### 5.3 Estimate herding in bearish and bullish market conditions

Approach suggested by *Zheng (2010)* contains all values with negative returns as the “lower side” and all the positive returns as “higher side” of the market, in this manner there is no normal market situations i.e. if the return is negative it is “lower extreme” and if the return is positive it is “higher extreme”. If herding is going to be investigating in extreme bearish or bullish market condition then the procedure suggested by *Christi and Huang (1995)* provides worthy results and if the herding tested over normal bearish and bullish market conditions then the method offered by *Zheng, (2010)* provides satisfactory results. The following method used by *Zheng (2010)* to investigate herding behavior in “bearish and bullish” market conditions. We did this for each sector separately.

$$CSAD_t = \beta_0 + \beta_1(d)R_{m,t} + \beta_2(1-d)R_{m,t} + \beta_3(d)R_{m,t}^2 + \beta_4(1-d)R_{m,t}^2 + \varepsilon_t \quad 5.3$$

$d$  represent dummy takes value one if the return is positive otherwise it is zero. The negative and significant  $\beta_3$  represents the prevalence of herding in the lower extreme market situation, while negative significant  $\beta_4$  provides existing of herding in “higher extreme” of the market. The following given (table 5.3) covers the outcomes built on the equation 5.3 which evaluate the herding behavior in extreme market conditions. During the period of stress high volatility market circumstances, the stakeholders has high tendency to imitate each other by suppressing their own analysis and decisions about the market. It is also decided that the “bad or good news put high pressure on the market and the stockholders significantly herd in lower extreme and in the higher extreme of the market *Christi and Huang (1995)* and *Khorana and Change (2000)*).

Some sectors have significant herding in the higher extreme or bullish market conditions at 1% level of significance, while refinery sector and cable and electronic goods sector have herding at 10% and 5% level of significance respectively. Some sectors like transport, modarbas, textile composite, textile spinning synthetic and rayon, leasing, investment banks, insurance, oil and gas marketing, oil and gas exploration and engineering have herding phenomena as well but not significant. There exist no herding phenomena in bullish market condition for sugar and allied industries, automobiles, commercial banks, chemical and power generation and distribution sectors.

While on the other hand lower extreme market conditions or bearish market conditions almost 19 sectors have significant herding in lower extreme market conditions and overall Karachi stock exchange (KSE) has no signal of herding behavior. These results are in line with line with Khorana and Change (2000), Christi and Huang (1995) suggest that in extreme market conditions there is high tendency to mimic each other and suppress their own decisions. Both the results from extreme market conditions i.e. table 5.2 and table 5.3 displays same results at some extent. In table 5.2 most of the sectors have significant herding in lower extreme while table 5.3 display significant herding in lower extreme (bearish) conditions in almost nineteen sectors.

**Table 5.3 herding behavior in bearish and bullish conditions**

Name of sector	$\beta_0$	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_4$	$R^2$
Cable and electronic goods	.9622603*** (.030225)	.50081*** (.0677014)	-.46550*** (.086014)	-.10035*** (.030254)	-.10690** (.04628)	0.0710
Cement	1.05733*** (.023026)	.4842187*** (.05896)	-.35016*** (.06375)	-.12028*** (.02864)	-.10283*** (.03128)	0.0635
Close end Mutual funds	.87311*** (.025228)	.50898*** (.05995)	-.69627*** (.059749)	-.15201*** (.027555)	-.25085*** (.027177)	0.0695
Engineering	.784909*** (.021938)	.830921*** (.060994)	-.59562*** (.08227)	-.18728*** (.031311)	-.09113 (.059552)	0.2023
Food and personal care products	.948621*** (.02314)	.84358*** (.06077)	-.47586*** (.05991)	-.19094*** (.02959)	-.07803*** (.02984)	0.1722
Glass and ceramics	1.0038*** (.02537)	.70574*** (.066615)	-.40668*** (.07419)	-.22484*** (.03346)	-.06149 (.04067)	0.0940
Insurance	1.05461*** (.018888)	.42902*** (.06636)	-.40595*** (.086666)	.001916 (.045691)	-.080333 (.07293)	0.1197
Investment Banks	1.2033*** (.02031)	.29744*** (.05103)	-.121393* (.06038)	-.05327* (.02487)	-.03872 (.03504)	0.0533
Jute	.09242*** (.01682)	1.66605*** (.04419)	-1.8433*** (.05150)	-.39355*** (.01988)	-.48804*** (.02740)	0.6355
Leasing	1.0739*** (.02620)	.482904*** (.06597)	-.32350*** (.06953)	-.13266*** (.032497)	-.0302915 (.03527)	0.0579
Lather and tanneries	.52678*** (.02146)	1.1797*** (.05816)	-.1.1095*** (.082062)	-.28451*** (.03020)	-.26333*** (.05596)	0.3224
Paper and board	.88217*** (.024683)	.656204*** (.061499)	-.51498*** (.069689)	-.16076*** (.029732)	-.15478*** (.037708)	0.1089
Pharmaceuticals	.72309*** (.02137)	.88116*** (.060002)	-.67333*** (.07416)	-.19511*** (.029655)	-.16204*** (.04429)	0.2066
Refinery	.75214*** (.02740)	.61227*** (.06019)	-.29169*** (.06605)	-.13757*** (.02420)	-.06531* (.02945)	0.1042
Sugar and allied industry	1.12104*** (.019791)	.212055*** (.071053)	-.20486*** (.052528)	.042743 (.048882)	.075137*** (.02567)	0.0754
Synthetic and rayon	1.73746*** (.05624)	.424201*** (.16234)	-.23027 (.14518)	-.16247* (.0890770)	-.093672 (.073934)	0.0047
Tobacco	.36018*** (.024886)	1.4309*** (.053108)	-1.1584*** (.071196)	-.33032*** (.0195959)	-.29915*** (.035060)	0.3626
Textile spinning	1.54724*** (.02181)	.18350*** (.070304)	-.07635 (.071576)	-.02432 (.04403)	-.063718 (.04572)	0.0197
Textile composite	1.2023*** (.02075)	.41127*** (.06154)	-.23943* (.09247)	-.08971* (.03547)	-.04992 (.07474)	0.0724
Transport	.994689*** (.03185)	.49638*** (.07111)	-.31707*** (.069692)	-.14438*** (.030332)	-.04232 (.029320)	0.0411
Modarbas	1.3062*** (0.0535)	1.2921*** (0.0947)	-1.1057*** (0.0943)	-0.0722** (0.0282)	-0.0005 (0.0281)	0.4367
Automobiles	1.0216*** (0.0922)	0.7465*** (0.2453)	-0.7803** (0.3093)	0.1998** (0.0902)	0.0633 (0.1827)	0.3757
Commercial Banks	1.0179***	0.7005***	-0.6855***	0.0549**	0.0265	0.3991

	(0.0316)	(0.0707)	(0.0644)	(0.0269)	(0.0206)	
Chemical	1.4590*** (0.0249)	0.3586*** (0.0131)	-0.2383*** (0.0712)	0.1998** (0.0902)	0.2813*** (0.0264)	0.4437
Power generation and distribution	1.9241*** (0.0673)	0.5289*** (0.1037)	-0.8258*** (0.1053)	0.1467*** (0.0290)	0.0759*** (0.0290)	0.4138
Health	0.1947** (0.0610)	1.6240*** (0.1122)	-1.4555*** (0.1151)	-0.1726*** (0.0316)	-0.1320*** (0.0314)	0.2989
Oil & Gas Exploration	0.9601*** (0.0348)	0.3443*** (0.0732)	-0.5451*** (0.0871)	0.0971*** (0.0274)	-0.0545 (0.0411)	0.1816
Oil & Gas Marketing	1.2252*** (0.0303)	0.0768 (0.0654)	-0.4256*** (0.0800)	0.1956*** (0.0256)	-0.0256 (0.0398)	0.1909
KSE	1.1959*** (.008917)	-0.10136 (0.09569)	0.111196* (0.06611)	0.12017 (0.18207)	0.19788** (0.09935)	0.4840

*Note:* The values in the parenthesis below the coefficients are *p* values

(\*) Significant at 10%, (\*\*) Significant at 5%, (\*\*\*) Significant at 1%

## 5.4 Estimation of herding behavior on annual basis

The investigation is built on the daily stock returns and it covered from the period January 2007 to July 2015, in this time period Pakistan's economy suffer due to different problems i.e. political instability, terrorist attacks, Pakistan Army Operations (Zarb e Azab) against terrorists forces. To study and to depict the effect of these events on KSE it is required to evaluate the herd behavior on yearly basis. For annual bases investigation Khorana and Chang (2000) suggest cross sectional absolute deviation model (CSAD) which is as follows

$$CSAD_t = \beta_0 + \beta_1 R_{m,t} + \beta_2 |R_{m,t}| + \beta_3 R_{m,t}^2 + \varepsilon_t \quad 5.4$$

To capture the consequence of nonlinearity of the relationship between individual and average market return diffusion; the negative significant  $\beta_2$  represents the presence of the herding behavior in the specific market. We did this procedure for each sector separately. The below given table 5.4 contained the results of valuation of herding behavior in KSE and in its sectors, on yearly basis. In 2007 most of the sectors including KSE exhibits herding behavior significantly except insurance, paper and board, pharmaceuticals, Sugar and allied industries, synthetic and rayon and textile spinning.

**Table 5.4 Estimation of herding on annual basis**

Name of sector	2007 $\beta_3$	2008 $\beta_3$	2009 $\beta_3$	2010 $\beta_3$	2011 $\beta_3$	2012 $\beta_3$	2013 $\beta_3$	2014 $\beta_3$	2015 $\beta_3$	2007-15 $\beta_3$
Cable & Electric Goods	-0.05378* (0.059125)	-0.05365* (0.084099)	0.4583*** (0.124007)	-0.006646 (0.149044)	-0.0826** (0.108693)	-0.04206 (0.11341)	-0.1404** (0.08028)	-0.0770** (0.06419)	0.07531* (0.1182)	-0.101*** (0.02837)
Cement	-0.05414* (0.0552)	-0.317*** (0.0892)	-0.256*** (0.0716)	-0.0543** (0.0772)	-0.1106** (0.0838)	0.01198 (0.0871)	-0.0679** (0.0788)	-0.0561** (0.0699)	-0.1106** (0.0642)	-0.112*** (0.02387)
Close End Mutual Funds	-0.01117* (0.0563)	-0.377*** (0.0686)	-0.212*** (0.0598)	-0.0721** (0.0637)	-0.1257** (0.0579)	-0.2229** (0.10864)	-0.2220** (0.0638)	-0.06096* (0.0974)	-0.1960** (0.0742)	-0.202*** (0.02200)
Engineering	-0.11610* (0.092192)	-0.2171** (0.1216)	-0.3325** (0.15227)	-0.08775* (0.14808)	-0.07945* (0.15162)	-0.2511** (0.0940)	-0.1619** (0.1042)	-0.1674** (0.08177)	-0.01215 (0.077263)	-1.751*** (0.3043)
Food & Personal care products	-1.3612*** (0.03681)	-0.2952** (0.10530)	-0.37457** (0.20362)	-0.12533** (0.0914)	-0.05518* (0.12281)	-0.06853** (0.08179)	-0.09419** (0.07780)	-0.14254** (0.07299)	-0.10774** (0.14008)	-0.135*** (0.2336)
Glass & Ceramics	-0.20378** (0.07568)	-0.00034* (0.08469)	-0.09196** (0.098133)	-0.04080* (0.0707)	-0.18015** (0.116127)	-0.17129** (0.08793)	-0.25333** (0.12632)	-0.09298** (0.06898)	-0.35582** (0.10697)	-0.164*** (0.2921)
Insurance	0.06122* (0.0959)	0.02892* (0.14551)	-0.0448619 (0.16942)	0.036615 (0.14553)	-0.33189** (0.18919)	-0.0339426 (0.10288)	0.17894** (0.19309)	-0.16752** (0.15488)	0.09547* (0.1944)	-0.0147 (0.04318)
Investment Banks	-0.0999** (0.06300)	-0.1573** (0.049369)	-0.05920** (0.06205)	-0.039924* (0.08385)	-0.05005* (0.080972)	0.0228203 (0.08685)	-0.15495** (0.08872)	-0.0221007 (0.07963)	-0.12791** (0.09188)	-0.0493** (0.02279)
Jute	-0.596*** (0.05799)	-0.355*** (0.05199)	-0.3913*** (0.06488)	-0.409*** (0.05933)	-0.4086*** (0.04992)	-0.5543*** (0.06173)	-0.4372*** (0.050834)	-0.431*** (0.04174)	-0.441*** (0.07021)	-0.423*** (0.0172)
Leasing	-0.0231** (0.03382)	-0.1084** (0.10053)	-0.33971** (0.104185)	-0.1884** (0.07747)	-0.23689** (0.09974)	-0.15307** (0.12478)	-0.06307* (0.12172)	-0.0982** (0.07632)	-0.1190** (0.13549)	-0.087*** (0.02678)
Lather & Tanneries	-0.258*** (0.06562)	-0.397*** (0.06938)	-0.6733*** (0.10557)	-0.2106** (0.14128)	-0.16396** (0.11800)	-0.14386** (0.102485)	-0.12571** (0.10284)	-0.1633** (0.06502)	-0.054408 (0.16082)	-0.281*** (0.2891)
Paper & Board	0.030262* (0.10619)	-0.2227** (0.10347)	-0.17275** (0.11533)	-0.1512** (0.08867)	-0.03613* (0.07705)	-0.27543** (0.11602)	-0.11579** (0.080225)	-0.02625* (0.04291)	-0.1649** (0.07700)	-0.158*** (0.02626)
Pharmaceuticals	0.007929* (0.13078)	-0.513*** (0.125161)	-0.4358*** (0.106712)	0.39123** (0.21001)	0.65916** (0.19338)	0.19392** (0.11101)	-0.23283** (0.08431)	-0.1388** (0.05812)	-0.0578** (0.06672)	-0.186*** (0.02734)
Refinery	-0.0769** (0.06656)	-0.43426* (0.071045)	-0.0162186 (0.06997)	-0.04460* (0.08052)	-0.12321** (0.059077)	0.029733* (0.053264)	-0.08760** (0.042604)	-0.0479** (0.05298)	-0.2260** (0.07425)	-0.111*** (0.02123)
Sugar & Allied Industry	0.1543*** (0.03725)	0.0445193 (0.150494)	-0.15482** (0.184804)	0.0165657 (0.16287)	0.073746* (0.149451)	-0.116047* (0.119266)	0.0485914 (0.128523)	0.15855** (0.11041)	-0.1659** (0.15082)	0.0699*** (0.02437)
Synthetic Rayon	0.25741** (0.33111)	-0.4370** (0.218519)	-0.1989** (0.183134)	-0.092726 (0.25066)	0.0491718 (0.175889)	-0.112565* (0.171562)	-0.080325* (0.206942)	-0.11378* (0.17863)	-0.10891* (0.19439)	-0.1191* (0.06459)
Tobacco	-0.369*** (0.04682)	-0.535*** (0.09337)	-0.285*** (0.060181)	-0.1873** (0.08277)	-0.454*** (0.088688)	-0.358*** (0.08581)	-0.3581*** (0.085786)	-0.1267** (0.04957)	-0.389*** (0.09394)	-0.324*** (0.0185)
Textile Spinning	0.16232** (0.07987)	-0.164** (0.14513)	0.0366464 (0.13122)	-0.1894** (0.13379)	-0.22464** (0.131907)	-0.09363** (0.126440)	-0.0297216 (0.113797)	0.0014043 (0.07720)	-0.0826** (0.09444)	-0.0429 (0.03613)
Textile	-0.1338** (0.1285934)	-0.1429** (0.177016)	-0.07061** (0.09269)	0.04630* (0.09411)	-0.18472** (0.12195)	0.0365625 (0.098831)	-0.0054226 (0.097189)	-0.1788** (0.08977)	-0.1907** (0.12110)	-0.0861** (0.03487)
Transport	-0.02627* (0.05428)	-0.297*** (0.0741)	-0.21270** (0.071249)	0.0222907 (0.0818731)	-0.18308** (0.0705438)	-0.09780** (0.0843636)	0.0761842** (0.0742697)	0.044285* (0.0684439)	-0.40213** (0.1815297)	-0.090*** (0.0238)



Modarba	0.1643** (0.0531)	0.0922 (0.0631)	-0.2178** (0.0587)	-0.0996 (0.0645)	0.1257 (0.0798)	0.0510 (0.0829)	-0.0079 (0.0462)	0.1080 (0.0807)	-0.03065 (.17772)	-0.0361* (0.0225)
Automobiles	0.1580*** 0.0546	0.3852*** (0.0915)	-0.5460** (0.1081)	0.0603 (0.0428)	0.3404*** (0.0578)	0.1944*** (0.0377)	-0.0789 (0.0673)	0.1585*** (0.0564)	-1.036 (.05240)	0.1845** (0.0878)
Commercial Bank	0.3546*** (0.0823)	0.5010*** (0.0667)	-0.0391 (0.0449)	0.0549 (0.0480)	0.2715*** (0.0656)	0.1338** (0.0659)	0.1597*** (0.0524)	0.0046 (0.0665)	.02523 (.05955)	0.0357* (0.0182)
Chemical	0.0238 (0.0496)	0.2315*** (0.0514)	-0.0402 (0.0646)	0.1125* (0.0621)	0.3071*** (0.0420)	0.2472*** (0.0658)	0.2607** (0.1008)	0.1251** (0.0560)	.22963 (.09075)	0.1248*** (0.0209)
Electricity	0.1580*** 0.0546	-0.0170 (0.0610)	0.1454 (0.0921)	0.2018*** (0.0739)	0.0541 (0.0685)	0.1219** (0.0557)	-0.0247 (0.0451)	0.1210** (.509)	-1.4737 (.068509)	0.1135*** (0.0229)
Health	-0.0191 (0.0178)	-0.3603** (0.0940)	-0.1574** (0.0566)	-0.1849** (0.0628)	-0.5165* (0.2702)	-0.2764** (0.0646)	-0.1674** (0.0566)	-0.4165* (0.2702)	-0.3627* (0.0352)	-0.1522** (0.0242)
Oil & Gas Exploration	-0.2011** (0.0894)	0.2841 (0.1858)	0.1655*** (0.0545)	0.0595 (0.1162)	0.2968 (0.0838)	0.0312 (0.0661)	0.0076 (0.0612)	0.0229 (0.1012)	-1.1808 (.06190)	0.0598** (0.0254)
Oil & Gas Marketing	-0.0905* (0.0547)	0.3455*** (0.550)	0.3319*** (0.0536)	0.0531 (0.0915)	-0.0446 (0.0981)	-0.0992 (0.0759)	-0.0206 (0.0706)	0.1869*** (0.0508)	-0.01137 (0.0510)	0.1457*** (0.0240)
KSE	-0.2258 (0.34647)	-0.5855 (0.44126)	0.26078 (0.29622)	0.2249 (0.2555)	-0.177727 (0.25535)	0.8490 (0.31333)	0.09931 (0.19330)	0.17217 (0.20893)	0.39723 (0.2227)	0.18691* (0.09602)

*Note:* The values in the parenthesis below the coefficients are *p* values

(\*) Significant at 10%, (\*\*) Significant at 5%, (\*\*\*) Significant at 1%

Almost all sectors have herding phenomena if the analysis carried out from January 2007 to July 2015 on annual basis but it varies from time to time. Some of the sectors have consistently faced herding phenomena like cable and electric goods, cement, closed end mutual funds, engineering, food and personal care products, glass and ceramics, investment banks, jute, leasing, lathe and tanneries, paper and board, pharmaceuticals, refinery, synthetic and rayon, tobacco, transport and health. While on the other hand overall Karachi stock exchange (KSE) face weak herding phenomena in years 2007-2008 and in 2011.



## 5.5 Concluding remarks

In 5.1 section of this chapter CSAD method used proposed by Khorana and Chang (2000) herding exist significantly in some sectors of KSE but overall in KSE there is no sign for occurrence of herding in the market. In section 5.2 applying CSSD suggested by *Christi and Huang* (1995) there exists strong sign of herding at lower extreme in all sectors of KSE and existence of significant herding in overall KSE at lower extreme of the market. Because of higher tendency to mimic each other in stress conditions, people suppress their own decisions and follow others Khorana and Change (2000). Table 5.3 results suggest that most of the sectors have phenomena of herding in lower extreme but overall in KSE no evidence of herding exist there. So due to different market structure and different scenario, different results of herding prevails in different market conditions.

## Chapter 6

### 6.1 Conclusion

The determination of the analysis is to catch the signals of herding behavior in KSE and its sectors, to evaluate this indication the data on daily basis of stock prices collected from the period January 2007 to July 2015. The valuation procedure separated into three different phases according to the market conditions, i.e. normal market conditions, "extreme lower and higher market conditions", "bearish and bullish" phases of the market. For assessment we have used three different approaches of estimation for different phases, for normal market conditions cross sectional absolute deviation (CSAD) by *Khorana and Chang* (2000) is used, for extreme or stress market conditions cross sectional standard deviation (CSSD) is used, "bearish and bullish market" situation, method introduced by *Zheng* (2010) is used.

On the first phase the normal market conditions are considered, as most of the markets are operating at normal market conditions irrespective of sudden events. This estimation is done by the CSAD method by *Khorana and Chang* (2000). Empirical results of the table 5.1 suggest that most of the sectors have herding at 1% of the significant level apart from textile spinning and investment banks have herding at 5% of the significance level, while synthetic and rayon has herding at 10% of the significance level except insurance, sugar and allied industries, automobiles, commercial banks, chemicals, power generation and distribution, oil and gas exploration and oil and gas marketing have no clue for herding behavior.

*Khorana and Chang* (2000) Proposed that emerging economies like Taiwan, South Korea etc have more tendency for herding as compared to developed economies. So these results are in line with the findings of *Khorana and Chang* (2000).

At second phase the stress market conditions are measured, as most of the researchers be sure of that there are greater hazards of herding in stress circumstances *Christi and Huang* (1995), *Khorana and Chang* (2000). The table 5.2 covers the outcomes estimated grounded on the CSSD equation, the outcomes displays that the KSE and all its sectors which are in discussion have the significant sign of herding in the lower extreme of the market except investment banks, while there is only one confirmation of herding found for investment banks in higher extreme of the market. These outcomes are in line with the outcomes by many scholars included *Christi and Huang* (1995), *Khorana and Chang* (2000), *Thomas and Jiandog* (2010) etc. The outcomes are also in line of the argument that the “bad news have higher influence on the stock markets as compare to the good news”.

In next phase “bearish and bullish market” conditions are measured and the outcomes estimated using *Zheng* (2010) method to check the validity of cross sectional standard deviation (CSSD) method, table 5.3 suggested miscellaneous results. Some sectors have significant herding behavior at lower extreme (bearish condition), some follow weak evidence of herding behavior except sugar and allied industries, automobiles, commercial banks, chemicals, power generation and distribution sector and in KSE where no clue no herding behavior exist at lower extreme.

While on the other side higher extreme market conditions or bullish market conditions almost 19 sectors have significant herding in higher extreme market conditions and overall Karachi stock exchange (KSE) has no signal of herding behavior. These results are in line with line with *Khorana and Chang (2000)* *Christi and Huang (1995)* suggest that in extreme market conditions there exists high tendency to mimic each other and suppress their own decisions and follow others.

The last segment of the empirical estimation contained on the valuation of herding behavior in KSE and its sectors on yearly basis. The table 5.4 display that the herding behavior fluctuate in different time eras, as the some sectors and KSE have sign of herding in different years while in some years there exist no sign for herding in those sectors. Herding behavior prevails from January 2007 till July 2007 in cable and electric goods, cement, closed end mutual funds, engineering, food and personal care products, glass and ceramics, investment banks, jute, leasing, lather and tanneries, paper and board, pharmaceuticals, refinery, synthetic and rayon, tobacco, transport and health sectors, while on the other hand overall Karachi stock exchange (KSE) face weak herding phenomena in years 2007-2008 and in 2011.

Henceforth study suggests that herding behavior in KSE and its sectors not only exist in recent periods but it also varies from time to time. The possibility of stakeholders to herd in stress market circumstances increases and the behavior of stakeholders in KSE are also different in “bearish and bullish market” circumstances which also have substantial effect on stakeholder’s judgment to herd.

This research is restricted to the main 28 sectors of the KSE; further research can be done on all of the sectors of the KSE. The research can also be magnify and separated into long run analysis and short run analysis by collecting and estimating the weekly, monthly and quarterly data for the stock prices and rationality can also be analyzed. This work can be extended by comparing emerging markets like Mumbai Stock Exchange, Dhaka Stock Exchange and Karachi Stock Exchange to find out which market is more efficient.

## **6.2 Policy suggestions**

In most of the time information's are inconsistent between any debtor and creditor. Hence, there will always be some chances of information cascades, reputation and return based herding in emerging markets like Karachi Stock Exchange (KSE).

- Revelation of rules,
- Timely availability of information
- Well planned incentive agreements
- Expansion of futures and forward markets may bring information about market expectations into the public territory
- Higher transparency will shrink price instability.

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## **Appendix**

### Summary of Literature Review

References	Title	Methodology	Region of Analysis	Data and Time Period of Analysis	Findings
(Yao, Jaun, 2014)	Investor herding behavior of Chinese stock market	CSSD CSAD	China	Daily and weekly stock prices from Jan 1st 1999 till 31 <sup>st</sup> Dec 2008.	Herding exist particularly in Chinese B shares markets.
(Thomas and Jiandog, 2009)	Herding behavior in the Athens Stock Exchange	CSSD CSAD	Greece	(1985-2004)	Evidence of herding behavior exist
(Tan and Nelling, 2008)	Herding behavior in Chinese stock markets: An examination of A and B shares	CSSD CSAD	China	Stock of A & B shares (1996-2007)	Herding exist in Short run (daily data) but not in long run (Weekly & Monthly)
(Weifeng and Cheng, 2010)	Mutual fund herding its impact on stock returns: Evidence from the Taiwan stock market	Sias (2004)	Taiwan	Mutual funds of Taiwan stock market 2008	Herding exists in mutual funds trading returns in Taiwan Stock Market.
(Philippas and Fotini, 2011)	Cross-country effects in herding behavior: Evidence from four south European markets	CSSD & CSAD	PIGS (Portuguese, Italy, Greece and Spain).	Stock market returns of all countries 2011	Herding exist in pigs stock markets, relation between herding forces also exist.
(Wohar and Bartosz, 2013)	International Herding: Does it differ across sectors?	CSSD & CSAD	Panel of thirty two countries	Closing values of market indices both at national level and sectoral level 2013	No clue of international herding on the national indices basis, however, herding exist across sectors specially in basic materials and newly evolved sectors

(Ferreira and Konstantinos, 2013)	Institutional industry herding: Intentional or Spurious?	Sias 2004	Spain	Data of mutual funds and portfolios in Spanish market 2013	Significant herding exist in Spanish mutual funds both at national level and industry level
(Klein, 2013)	Time-variations in herding behavior: Evidence from a Markov switching SUR model	CSSD & CSAD model is MSSUR	USA and Europe	Market returns in USA and European markets 2013	Significant herding and volatility in herding behavior detected
(Khorana and Echange, 2000)	An examination of herd behavior in equity markets: An international perspective	CSSD CSAD	USA, Hong Kong, South Korea and Taiwan	Market returns of all countries 2000	Herding in emerging markets i.e. South Korea and Taiwan, no evidence of herding in developed markets i.e. Japan and USA
(Kutan and Rizo, 2006)	Does herding behavior exist in Chinese Stock markets?	CSSD	China	Daily stock return data 1999 to 2002 for 375 Chinese stocks	Herding exist in Chinese Stock markets
(Tan and Chang, 2010)	Empirical investigation of herding behavior in Chinese stock markets: Evidence from Quantile regression analysis	CSSD CSAD	China	Daily data of A&B Shares 1996-2007	Herding exist in lower quantiles as compare to higher quantile
(Singh, H and Paulo, 2011)	Herding behaviour in the Chinese and Indian stock markets	CSSD CSAD	India and China	Daily returns of stock returns of both countries 2011	Herding exist in both Indian and Chinese market but different in nature
(Khan, B and Tariq, 2013)	Herding behavior in Karachi Stock Exchange	CSSD CSAD	Pakistan	Monthly stock returns of KSE 100 index	No evidence of herding in KSE
(Chimpf, A and Jesper, 2013)	What do professional	Ordered choice	USA, UK, Germany,	Monthly survey of 350	Investor's expectations influenced by the average expectations of the

2013)	forecasters' stock market expectations tell us about Herding, information extraction and beauty contests?	regression models.	France, Italy, Japan,	professional forecasters from large banks, institutional investors	market
(Lin, Y and Anchor, Y, 2014)	Herding of institutional investors and margin traders on extreme market movements	CSSD & CSAD	Taiwan	Daily trading data of stocks of Taiwan's Stock exchange	Herding followed by the foreign investors, no evidence by local investors
(Pereiraba and Elisabete, 2014)	Herding behaviour and sentiment: Evidence in a small European market	CSSD & CSAD	Portugal	Portuguese stock PSI-20 index, (2003-2011)	Weak evidence of herding found
(Lee, c and Shih, T, 2012)	Empirical research of herding behavior in the Pacific Basin stock markets	Granger Causality Test	Pacific Basin countries		Herding phenomena exist in Pacific Basin
(Costa Jr and Almeida, R, 2012)	Herd Behavior in Latin American Stock Markets	CSAD	Argentina, Brazil, Chile, Mexico, and the United States	Daily closing prices and trading volumes from January 3, 2000 to September 15, 2010 from the stock markets	Herding exist in Latin American Stock markets.
Sapian, R and Dehghani, P, 2014)	Sectoral herding behavior in the aftermarket of Malaysian IPOs	CSSD CSAD	Malaysia	2001 to 2011	Herding phenomena subsist in Malaysian IPOs
Hsu, c and e, Y, 2015)	The impact of Macroeconomic factors on the herding behavior of investors	CSSD CSAD	Taiwan	January 4, 2000 to December 28, 2012	Evidence for the existence of herding behavior by investors in Taiwan
Ahsan,	Herding in Dhaka	CSSD	Banglades	Daily and	Absence of herding behavior

2013)	Stock Exchange	CSAD	h	monthly returns for all the stocks listed on DSE for the period of January, 2005 to December, 2011,	
Philippas and Fotini, (2011)	An examination of herd behavior in four Mediterranean stock markets	CSSD CSAD	Greek, Italian, Portuguese and Spanish	daily data used for the years 1998-2008	Presence of herding behavior
Welling and Chiang, T., (2011)	Dynamic herding behavior in Pacific-Basin markets: Evidence and implications	CSAD	Australia, Hong Kong, Japan, Singapore, US, and six emerging Asian markets, including China (CN), Indonesia (ID), Malaysia (MA), South Korea (KR), Thailand (TH), and Taiwan (TW).	Data of Daily stock prices from 2 <sup>nd</sup> July 1997 till 23 <sup>rd</sup> March 2009	Herding is present in both rising and falling markets
Sengupta, J and Das, J., (2012)	An Examination of Herd Behavior: An Empirical Study on Indian Equity Market	CSSD CSAD	India	The data consists of total returns of each stock from 1st April, 2006 to 31st March, 2011	Absence of herding behavior