HERDING BEHAVIOR IN BANKING STOCKS: EVIDENCE FROM PAKISTANI EQUITY MARKET

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CERTIFICATE

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Ayesha Khan

Dedication

This thesis is dedicated to
My parents (Mr. and Mrs.Naseer Sultan)
Who trust me and inspired me to start this journey,
,kept me moving through rigorous criticism,
and stimulated me to complete it all the way to the end.

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CONTENTS

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ACRONYMS

CSAD	Cross-sectional absolute deviation
CSSD	Cross sectional standard deviation
CAPM	Capital Asset Pricing Model
EMH	Efficient Market Hypothesis
PSX	Pakistan Stock Exchange
ADF	Augmented Dickey Fuller
OLS	Ordinary Least Square

ABSTRACT

This study examines the herding behavior of banking sector of Pakistan by using 20 banks listed at Pakistan stock exchange (PSX) for the period of 2009 to 2018. The study has employed two different methodologies suggested by Christie & Huang (1995) and Chang, Cheng, and Khorana (2000) to investigate the herding behavior of the banking sector. The results of the study found no herding behavior in the Pakistan banking sector during 2009-2018. It explains clearly that investors are not forming herds in the times of asymmetry in the market regarding liquidity and volatility. Similarly, this study has also investigated the herding behavior in the presence of different macroeconomic variables. The results report that macroeconomic indicators are not considered by financial investors while making investment decisions. The study suggests that the banking stocks of PSX are inefficient and does not follow the assumption of efficient market hypothesis (EMH). The reasons behind this irrational behavior is not yet clearly investigated and specified. Future researchers can explore the reasons of these inefficiencies in the Pakistani market.

Keywords: Herding behavior, EMH, Pakistan Stock Exchange, liquidity, volatility, cross-sectional standard deviation, cross sectional absolute deviation, banking sector.

CHAPTER 1

INTRODUCTION

In the finance literature, herding behavior refers to describe the decision making of investors, in which the decision of investors correlates or replicate the decision of other investors. Herding is a practice of investors who tries to ride on others' information and copy others' trading behavior regardless of the information they possess, anticipating that others are better informed (Banerjee, 1992). Decision making is based on information and experiences which determine the efficiency in financial markets. The allocation of resources by portfolio managers in financial instruments (bonds, stocks, mutual funds) is a major part of their decision making. Many studies have been held to investigate the investment decisions of economic agents (Qasim et al., 2019) .These investment behaviors are determined on the basis of two things. One is the investment horizon and the other is the behavior of the market due to fads and speculative activities of noise trader in the financial markets (Chang, Cheng, & Khorana, 2000).

Decisions are not taken in isolation rather they are bounded by different social and economic situations. Therefore decision making is somehow influenced by others' decisions. Similarly while making investment decisions; investors usually follow others(De Bondt et al., 2008) . Financial market decisions are always based on rational choices and some information related to the financial asset or investors simply follow other investors without taking into account their private information and instincts (Bikhchandani et al.,1992 ; Nofsinger & Sias, 1999 ; Banerjee, 1992). Such imitating behavior of investors is known as herding behavior (Javaira & Hassan, 2015). This

behavioral tendency between investors' result in a "herd" of investors and asset prices to be correlated (Gebka & Wohar, 2013).

Literature is devoted to herding behavior in both developed (Christie & Huang, 1995; Chang et al.,2000; Litimi et al., 2016; Bensaida, 2017) and emerging countries (Balcilar et al., 2013 ; Chen et al., 2017 ; Zheng et al., 2017). Some studies have investigated the herding behavior in the stocks of non-financial firms (Javed et al., 2001 ; Malik & Elahi, 2014; Javaira & Hassan, 2015; Shah et al., 2017; Qasim et al., 2018). This study aims to test herding behavior in the Pakistani banking sector, including all listed conventional and Islamic banks, by using the methodology of Christie & Huang(1995) and Chang et al. (2000).

1.1 Theoretical Background

Efficient market hypothesis (EMH) is a debatable area of classical finance, which assumes investors are "rational" and does not consider cognitive, behavioral and emotional biases. So such information which is possessed by every participant of the market erodes the idea of abnormal gains (Youssef & Mokni, 2018). The Efficient market refers to a market which response quickly to the arrival of new information and security prices fully reflect all the information (Shefrin & Statman, 2000). Since long it is believed that equity market conforms to EMH(Fama, 1970), but such noise trading behavior of investor stands at crossroads with Fama's EMH.

Since long it was believed that the functioning of financial markets is governed by EMH, but excess volatility in the expected stock prices points out certain other features of the market that are not based on stock-related information and this set the researcher back to revisit and review EMH. EMH has been criticized again and again as researchers argue that there are many behavioral factors other than stock fundamentals that affect investors' decision making in a financial market (Shiller,

1999).The first and the foremost assumption of EMH is “that a large number of profit-maximizing participants analyze and value securities, each independently of the others”(Frank K. Reilly, 2002).In an efficient market price reflects all the available information, on the basis of that information no one can beat the market. On the other hand, due to herding, investors derive security prices that are imprecise because of noise trading by simply following others neglecting information regarding security fundamentals.

In contrast to EMH, behavioral finance assumes that rationality is poisoned by emotions and limited cognitive power (Barberis & Thaler, 2003). A number of anomalies have been identified and these unresolved anomalies gave birth to behavioral finance e.g behavior of herd formation. One of these anomalies is herd formation. After facing many financial crises researchers have started to pay attention to the herding behavior by the stock market participants (Shah, Shah, & Khan, 2017). Assets prices deviate from its true and fair value due to herding behavior, therefore it affects the financial market stability, cause of the financial crisis and hence increases the financial markets' instability as returns become more volatile (Tan et al., 2008).

During the last decade, a new branch of financial economics has been emerged named as behavioral finance, which is related to the study of the various psychological traits and how these traits overshadow the rational behavior of investors, analysts, and portfolio managers. Behavioral finance seems like a new approach which proposes that although investors are chasing the same objective of profit maximization yet they are not always rational. Researchers while testing EMH found certain anomalies that lead to the emergence of behavioral finance. Behavioral finance is basically about how the organization, market and firm's financial/economic decisions are affected by psychological factors (De Bondt et al., 2008). Keynes (1936) was the first to pinpoint

the role of psychology in investors' decision making before the emergence of behavioral economics and finance. The study proposed that security prices often diverge from true intrinsic value and this divergence, booms, and busts, are due to human sentiments that reflect optimism and pessimism(Shefrin & Statman, 2012). Therefore behavioral finance emerged to bridge this gap in finance due to behaviors and cognitions.

The EMH proposition of rational decision making and wealth maximization is restricted by individual behavioral and psychological traits (Brown & Reilly, 2002). Hirshleifer (2015) also argues investor's sentiment affects financial markets. Hence it is suggested again and again to incorporate behavioral effects in rational decision making. Moreover, Thaler (1999) in his paper "The end of Behavioral Finance", states clearly his summary of the activity developed until that moment in the research on behavioral finance, with the following observation: *"I predict that in the not-too-distant future, the term "behavioral finance" will be correctly viewed as a redundant phrase. What other kind of finance is there? In their enlightenment, economists will routinely incorporate as much "behavior" into their models as they observe in the real world. After all, to do otherwise would be irrational."* However, there is no theory consolidated for behavioral finance yet. Fischer & Gerhardt (2007) state herding behavior as one of the basic behavioral factors that affect investors. Advocates of behavioral finance suggest that financial market imperfections are due to human responses, unconscious biases, and human errors (Yao et al., 2014)

1.2 Overview of the Banking sector in Pakistan:

The banking sector of Pakistan is one of the major sectors in PSX (Pakistan stock exchange). The Pakistan banking industry constitutes a total of around 31 banks, of which five are public-sector and four are foreign, while there are 22 local private banks. The noteworthy stake of the banking sector is held by six banks that are the chief

rivals in the economy. Precisely these banks hold more than 57 percent of deposits and are responsible to float 53 percent of advances in the business cycle. To be more specific, these banks collectively make up more than 57 percent of deposits and 53 percent of advance in the economy. The industry is regulated by the State Bank of Pakistan (SBP), which governs local banks under the ambit of its prudential regulations. Moreover, the banks also must comply with the international Basel III standards. Overall, the potential in this sector is huge. The commercial banks' sector comprises 20 listed banks with the listed capital of Rs 379,851.45 million & Market Capitalization of Rs 1,625,052.6 million. The profit after tax of the sector is Rs 144,270.4. The banking sector stocks are amongst the most traded stocks along with oil and gas sector stocks.[1]

In Pakistan's economy the Banking sector plays a major role and therefore PSX has developed a tradable banks index which tracks at least 80% free-float market capitalization of the banking sector. To check the relative performance of the segments, investors and market participants of the economy considers the tradable banks index as a benchmark.[2]That's how banks tradable index facilitate the investors, investing in banks. This shows that although the banking sector of Pakistan is not as developed as those of other countries and smaller in size yet trading activity is very high. Therefore it is of considerable attention that whether the investors investing in bank stocks shows a rational behavior or not. The irrational behavior of herding needs to be investigated in the banking sector of Pakistani stock market as this sector is an important part of the stock market having the highest market capitalization amongst all the business sectors registered in PSX.

[1] Pakistan Economic Survey 2017-18
[2] www.sbp.org.pk

1.3 Problem Statement

Herding behavior greatly affects the investment decisions of the market agents. This behavior has restricted investors to ignore their own information and follow other investors while investing in stocks, bonds or other financial assets. This irrational behavior brings inefficiency in the market. Such behavior might be the reason for bubbles and fads in the Pakistani stock market in the recent past. The banking sector of Pakistan is one of the major sectors in PSX. The market capitalization of this sector is highest amongst all business sectors listed in PSX which is Rs 1,625,052.6 million. There is huge profit potential for investors to capitalize in this sector. Therefore the irrational herd behavior needs to be investigated in the banking sector of PSX and its successive impact on banking sector returns.

1.4 Research Questions

This study aims to answer the following research questions:

1. Does herding behavior exist in the banking sector of Pakistan?
2. How asymmetric effects are associated with the banking sector returns, trading volume and return volatility
3. Whether herding behavior have an impact on banking returns under different market conditions?
4. Is there any difference in herding behavior in the presence of macroeconomic factors

1.5 Research Objectives

The study has the following research objectives:

1. To investigate the presence of herding behavior in the Pakistani banking sector.
2. To examine the presence of herding behavior during market asymmetries of trading volume and market volatility.
3. To check the robustness of the presence of herding in extreme market movements.
4. To explore the effect of macroeconomic factors while examining herding behavior.

1.6 Significance of Study

An assumption of efficient market states that prices change as a response to the arrival of new information. Pieces of evidence from certain past studies show that price adjustments are not always due to new information arrival or the information may be inefficient. This results in investors' decisions based on other signals rather than stock information. In fact, market participants may follow and imitate others instead of relying on their own information. Such imitating behavior results in a group behavior named as "herding". These behavioral characteristics may distort true price determination by impacting the risk and returns of stocks. Hence in this situation, the market will no longer be efficient (Shefrin & Statman, 2000) as prices drift away from their true value, creating excess price volatility. So such a deviation from EMH (efficient market hypothesis) must be explored as it increases volatility and eventually destabilizes the financial market (Javaira & Hassan, 2015)

Moreover, herding behavior of investors is vital mainly because herd formation increases the correlations among the stocks which result in sub-optimal portfolios as all

market agents are investing in similar securities, identifying and investing in negatively correlated stocks is a major challenge. (Demirer & Kutan, 2006)

In addition to a contribution to the body of knowledge about herding behavior, this study aims to investigate herding behavior in the Pakistani banking sector and tries to find out whether investors herd while investing in bank stocks. Banks are an important tenet of the stock market having the highest market capitalization. Investigating herding behavior enables us to understand whether banks' stocks are fairly priced in Pakistan. Moreover, it helps in a better understanding of the impact and level of herding behavior. Consequently, it helps in better valuation of the Bank stocks' prices.

CHAPTER 2

LITERATURE REVIEW

Various theories of economics support the argument that investors in a financial market behave rationally which means that the investors are fully aware of the information available and make investment decisions based on that information. Kahneman & Tversky (1972) gave a counter-argument and said that this is not always true. Perhaps investor tries to use a maximum of information and sources before making a decision yet this is just impossible to gather and evaluate all the information in every situation. Therefore investors use shortcuts, this concludes that personality and situation affect rational decision making.

Over the years herding behavior took prime importance among the body of literature and its many facets has been explored. Defining herding in today's complex environment of the financial world is a bit difficult. Researchers are working to differentiate this noise trading behavior from the normal rational behavior of the financial market. A series of researchers claim that herding has many different kinds. However, the clear picture of herding and its impact on the banking sector is not that clear and therefore this paper will throw light on herding in the banking sector. Before discussing this phenomenon in detail this paper gives a glimpse of several types of herding researchers have been identified. Moreover, herding will be seen with different aspects such as herding and financial distress, herding, and volatility.

2.1 Rational vs Irrational Herding

Christie and Huang (1995) also classified herding as rational and irrational herding. According to them, irrational herding is basically shown up when people start relying on others and cease believing in their own private information.

Devenow & Welch (1996) have proposed that herding has two contrasting views. One is the rational view of herding and the other is the non-rational or irrational view. The rational view focuses on investors who try to make optimal decisions that are restricted by information hindrances or incentive problems. The irrational view focuses on the psychology of investors. Irrational investors reap huge profits by simply relying more on others' information than their own and hence blindly imitate others instead of doing a rational analysis. In between these two views lies the third view which is the intermediate view. This view centers on the idea that to avoid information processing or acquisition cost investors use heuristics which makes them bounded rational and such influence cannot be eliminated by the rational activities of others.

Qasim et al. (2019) are of the view that investors are ready to take more risks when he/she is overconfident and hence just becomes irrational. In such a situation investment decisions are based on one's own beliefs and not by evaluation of the whole information available, therefore decisions and ultimately investors become irrational. On the other hand, the observations made by Christie & Huang (1995) is completely different. They said irrational herding behavior is seen as a byproduct of stress in financial markets. They add that in stress period investors do not want to take a risk rather they just follow others blindfolded. The anxiety brought about by the uncertainty in the financial market renders investors irrational and therefore they just flow with the market consensus.

Chang, Cheng, & Khorana (2000) propose that herding is irrational as investors do not do rational analysis and simply copy others. Prast (2000) states that irrational herding is better explained by cognitive psychology. He found that psychological factors have their effect on financial decisions when gathering information and interpreting it. It was suggested that herding behavior has limited explanation in

theories of economics and finance. Moreover, the study said that there are two views, the theory of cognitive dissonance and the principle of congruity, which are crucial while explaining crowding behavior. These concepts elaborate on how investors get biased towards the information they get, by turning away from the information that is contradictory to their existing beliefs or getting information i.e consonant with their past opinions to reduce dissonance. Therefore they back and support their decisions by ensuring that they make the same decisions as those of others and hence a crowding behavior arises that has no sound base of rationality.

Rational herding is also defined as a practice of unskilled managers who believe that other investors always make the best, precise and accurate decision and hence they used to overlook their own beliefs, opinions, and intelligence. Eventually, they start mimicking others' decisions by moving after their seniors. By doing so they get a feeling of being as reputable as their seniors are in the financial markets (Devenow & Welch, 1996).

2.2 Intentional vs. Unintentional (spurious) Herding

Financial circles make it quite difficult to characterize or specify herding. People are ambitious to discriminate herding from the normal regular financial market behavior. Kremer & Nautz (2013) while following Devenow and Welch (1996) sort out herding as of three different types. These are intentional, unintentional or spurious herding. Unintentional herding (also known as spurious herding) is an outcome of an efficient market. Though unintentional kind of herding can also be inefficient, if the underlying decision information is not related to stock fundamentals. Unintentional herding involves the same response of investors to publicly known information (Bikhchandani & Sharma, 2000) . It is the basic level of herding which results because

all the investors do the same market intelligence and get the same information and hence make similar decisions after analyzing the same stock related fundamentals.

Intentional herding is a broad level phenomenon that is sediment driven because some investors are followed by others intentionally. As a result, the same stocks are traded more and more without any strong basis of stock-related information and past opinions that investors hold. Therefore asset prices will no longer remain true, as they do not show underlying fundamental information, which leads to an increase in volatility and it became one of the prime reasons for the destabilization of financial markets. This implies that herding behavior has an evident potential to initiate or at least support the financial market collapse (Chen et al., 2017).Whereas when new investors make decisions they give priority to the decisions of the experienced investors with or without having the same information set as those of the experienced investors have, leading towards unintentional herding. Contrary,(Caparrelli, D'Arcangelis, & Cassuto, 2004) intentional herding is the opposite in which one completely denies his own information and prefers other information over their own. No matter how much sufficient and accurate is the information they possess, they just deliberately prefers other decisions to be followed at the cost of suppressing their own information (Caparrelli et al., 2004).

Unintentional herding by investors is the result of relying on similar characteristics of stocks such as liquidity (Falkenstein, 1996) or when different investors focus on the same information related to a particular stock or stocks, they all eventually arrive at similar decisions (Bikhchandani, Hirshleifer, & Welch, 1992). Similarly, practitioners having similar qualifications and experience interpret signals bring about by information in the same way and henceforth form a crowd. A simple example is a response to similar risk measures of a stock (Kremer & Nautz, 2013) .

2.3 Individual vs. Institutional Herding

Chasing other investors without any due diligence is termed as herding behavior in financial markets. In herds, if a certain investor invests somewhere in ABC stock, others also do the same without making any effort to make a decision based on stock fundamentals or investors are simply moving one after another. Selecting the best possible option from the available alternatives is a rational decision. Similarly, in financial markets and specifically in investment decisions rationality is to choose the best investment amongst all options available which serves you with the greatest of the benefits. Various theories of economics suggest that investors are fully rational that before making an investment decision they thoroughly analyze and evaluate all the possible alternatives, but practically it does not seems feasible because information abundance itself becomes a hindrance in the way of information analysis for being rational. As a result, while making a decision investor uses certain shortcuts. To reach good rational decision investors need a huge amount of information that is accurate and processed at the right time. Any delay or deficiency in information gain and processing brings a financial loss to an investor for the chosen investment. So information gain itself is a big challenge for investors. Individual investors do not have easy access to information because of insufficient resources. Whereas, institutional investors being rich in resources use these resources to gain complete and accurate information. To get the benefit of the institutional investors' information, all that individual can do is just simply follow the institutional investors' decisions which results in herding. Similarly, small institutions follow big and more reliable institutes (Qasim et al., 2019) .

On one hand researchers (Lakonishok et al., 1992; Nofsinger & Sias, 1999; Oehler & Chao, 2005) examine how herding is in practice by institutional investors because these investors have a significant influence on prices. Institutional investors

can move the market in their desired direction specifically when they herd. Similarly, (Chattopadhyay et al., 2017; Garg, Mitra, & Kumar, 2016) conclude that foreign institutional investors herd in Indian markets but its spillover effect on individual investors is much delayed. This delayed effect is because of a delay in information pass-on from institutional investors to individual investors. Similarly, Kremer & Nautz (2013) using high-frequency data that track every single transaction of institutional investors, found evidence of herding by institutional investors in the German stock market. Choi & Sias (2009) test and confirm Institutional industry herding.

On the other hand, Merli & Roger (2012) reveals how individual investor herds. They found an interesting relationship between past performance and individual herding. Moreover, they claim that if investors took a wrong decision in one period in the next period he will be more reliant on others' decisions and reluctant to rely on his own information, therefore herd.

2.4 Market Wide vs. Sectoral Herding

Many studies proposed another model of herding that depicts herding in a specific stock exchange/overall market. Economou et al. (2011) test herding in Greek, Italian Portuguese and Spanish markets. They conclude the presence of herding effects in Italian as well as Greek markets. Whereas the Spanish market has no such effects, while the Portuguese market has mixed evidence. Lao & Singh (2011) use CSAD approach of (Gleason et al., 2004) and conclude the presence of herding in both Chinese and Indian markets (where shanghai stock exchange and Bombay stock exchange are selected). However, the presence of herding varies as investors of Chinese market herds more when the market takes a downturn while Indian market herds in upturns of the market. Shah et al. (2017) have an extensive contribution in this regard. They viewed herding concerning trading volume and financial turmoil. Moreover, they investigated

the herding behavior of firms both towards the market and industry under the financial crisis. Similarly, they also checked herding behavior in industry portfolios towards the industry. Using the methodology of Christie & Huang (1995) the important results concluded includes that investors herd more in time of stress and crisis. In addition to this, it was concluded that large firms herd more than smaller ones, therefore seeing all the firms together will always have confounded results. This might be the reason that no proofs of herding in PSX are provided by Javaira & Hassan (2015).

Among the few studies aimed to capture the effect of sectoral or industry-wide herding, the study of Zheng et al. (2017) is the one who investigates herding behavior at the industry level, using 10 industries, for nine Asian markets. The study found that in comparison to national and international level herding is more evident at the industrial level because all the nine markets' results show the presence of industrial herding in major industries. Moreover, the results come up with the opinion that telecom and financial industries herd stronger than the utility sector. Similarly, Litimi et al. (2016) discuses that the American stock market has an overall herding behavior due to the existence of herding in 8 out of 12 sectors of the market. Cakan et al. (2016) are also consistent with these studies who found industry-wide herding in the Turkish stock exchange and confirms herding in four industries (financial, services, technology, and industrial stocks). Irrational behavior of prices is also reported by Gebka & Wohar (2013) while investigating different sectors of the economy. The main findings of this study proposed that herding exists mostly in sectors like basic materials, consumer services, and oil and gas stocks world-wide. In such a scenario where literature supports sectoral herding, market-wide herding can be misleading. Earlier Gebka & Wohar (2013) do not found market-wide herding but when different sectors are studied separately, herding is evident.

2.5 Herding and Trading Volume

The empirical investigation shows that in equity markets liquidity is one of the key factors affecting the information environment. Chordia et al. (2008) ; Tian et al. (2015)proposed that higher liquidity will increase information flow and hence informational efficiency. Conversely researchers Baker & Wurgler (2006) and Brennan & Wang (2007) argued that liquidity has a strong relationship with noise trading and sentiment investments. Arjoon & Bhatnagar (2017) proposed that trading volume is used as a proxy for liquidity as it better estimates the depth and breadth of the equity market. His findings concluded that an increase in trading leads to more herding in the market. This shows that greater liquidity fails to promote the accurate and timely dissemination of stock-related information. Instead, it is a pointer towards irrational and sentimental behavior of predominantly unsophisticated investors, who mimic the actions of other traders. To conclude liquidity is linked with information flow and noise trading so it is crucial to analyze its role in herding behavior, therefore this study attempts to find herding during both high and low liquidity.

2.6 Herding and Volatility

Many researchers explain herding to volatility (price fluctuations) and proposed that volatility triggers herding behavior. Holmes, Kallinterakis, & Ferreira (2011) suggest that in a highly volatile environment where risk is high, uncertainty increases. Therefore, in such an environment following others is a way of both uncertainty and risk avoidance and hence investors are more likely to herd. Thus higher volatility results in greater herding. Similarly, Balcilar et al. (2014) comprehends that the tendency of market participants to follow one another and ignoring own private information

increase in time of uncertainty where price fluctuations are more. These results are consistent with the results of Christie & Huang (1995) and also Chang et al. (2000)

Recently Arjoon & Bhatnagar (2017) also provide evidence regarding how volatility provokes herding behavior. He suggests that when the market is in stress, having high risk and uncertainty, investors are more susceptible to reject their specific information and specific skills of interpreting that information and just flow with the flow of the market.

2.7 Herding and Macroeconomic Variables

Meanwhile, several studies have examined the dynamic relationships between stock market volatility and macro-economic variables. Finance theory proposes that interest rates and stock prices have a negative correlation (Hamrita & Trifi, 2011). According to Jawad and Ulhaq (2012), the interest rate has a more direct effect on the financial market whereby an increase in the interest rate causes investors to make a change in the structure of their investment, generally from the capital market to fixed income securities which leads to a drop in stock prices.

Academics, as well as professional observers, have investigated the connection between stock prices unpredictability and different financial factors that are abstract to fiscal arrangement. One such factor is money supply; beginning investigations led during the 1960s and 1970s for the most part showed a solid driving connection between money supply changes and stock prices. Nonetheless, further investigations have raised issues about the idea of this relationship. They have affirmed the existence of a connection between money supply and stock prices however the timing of the relationship was kept under debate until a study of Beenstock and Chan (1988) emerged that look at the connection between equity markets and a set of macroeconomic factors

and give proof of a positive connection between equity returns and money supply and inflation.

2.8 Causes of Herding

Besides the in-depth demonstration of the herding behavior, researchers also tried to throw light on the main causes and key factors that initiate and promote herding behavior. One line of research focuses on reputational concerns of herding and says that when appraisal occurs relative to the industry average, managers are found to participate in decision making similar to others in the industry. Zwiebel (1995) and Dass et al. (2008) pinpoint reputational and relative performance based causes of herding behavior among fund managers which is very much similar to the view earlier given by Bikhchandani & Sharma (2000). Their view determined that it is the principal-agent relationship which is one of the root causes of herding. They proposed that the compensation plans offered or the employments terms and conditions force agents to the herd. As only those agents avail perks and benefits to whom the principal is pleased with. So every agent wants to convince the principal by taking decisions that other successful agents took (without any underlying sound information). As earlier proposed by Scharfstein & Stein (1990) that investors ignore their own private information to save their reputations and for this sake they used to follow the investment decisions of the mangers having a better reputation in the financial markets. The measurement of efficiency of the fund managers is carried out based on a relative assessment procedure. While organizations are busy in comparing the performance of managers, less efficient mangers are busy following the footsteps of the best performing managers, aiming to hide their inability to make better decisions than those of good performing managers. Such behavior misrepresents the evaluation of managers because, for those who are

evaluating, it is difficult to figure out whether the manager's performance is due to his own skills or just because of his replication towards good performing fellows.

A few examinations attempted to give bits of knowledge into the systems through which market members take part in crowding/herding. Theoretically, herd behavior involves the tendency of investors towards replicating the trading patterns of investment of other investors by observing their actions and actions' payoffs (Hirshleifer, Hou, Teoh, & Zhang, 2004) because others may know something better about the stock returns and their actions reveal this information (Chari & Kehoe, 1999 ; Mendoza & Calvo, 2000; Avery & Zemsky, 1998). As one cannot see or have others' information but what one can only receive is the underlying signal that information has and that signal resides in one's decision making. So by getting that signal one chooses to behave like the same and hence a herd is formed. Similarly, the model proposed by Mendoza & Calvo (2000) argued that it is the asymmetry of information that turns rational investors towards irrationality and hence they indulge in herding behavior According to Banerjee (1992) herding is caused when investors try to gain latent information of other investors by observing and following them. This behavior is like a waterfall and leads to an informational cascade. An information cascade is formed basically as a result of a suboptimal decision of an investor whose only optimum decision is to go with a predecessor investor notwithstanding his own information. The investor which follows predecessor blindly also gives his successor a signal through his decision making and hence the successor automatically becomes a part of this informational cascade. Therefore somehow all investors become a part of that cascade which does not stop and goes on. Gleason et al. (2004) proposed that agents tried to free ride on other successful agents' information as it is the cheapest source to get better

reliable information for decision making. According to him, it is the noise in the past prices that decrees future trading.

It is more likely to be evident that behavioral biases, being one of the reasons for herding, detract retail financial traders while making investment decisions leading towards herding. There are also strong shreds of evidence supporting the argument that professional investors have intentional and unintentional drives of herding which forces them to make similar investment strategies (Bikhchandani & Sharma, 2000). Particular features among the professional investors are shared which automatically depicts co-movement in their investment decisions, therefore making a crowd of investors moving in a specific direction unintentionally (spurious herding). Such co-movement results as a consequence of investors' ability of relative homogeneity (De Bondt and Teh, 1997), having similar characteristics like similarities in qualification(educational backgrounds), investment expertise and experience, the information they get, information processing skills and a common legislative structure they are contingent upon (Voronkova et al., 2005) .

Nofsinger & Sias (1999) and Bennett, Sias, & Starks (2003) proposed another investment style as one of the key factors that may lead to herding is the momentum-investment strategy based on positive feedback training. They proposed two classes of stocks/investments, one which continuously reaps more returns and others that bring fewer returns. In this style of investment, investors keep on buying previous winners and sell-out previous losers. It means fund managers keep on investing in stocks that are performing good and exit investments from the socks that are not performing well in the recent performance period. Instead of stock fundamentals, previous period performance dictates investors how to move on in the future period.

Some studies give asymmetry of information, the blame for herding. According to Kallinterakis & Kratunova (2007) some of the factors that promote herding behavior in emerging markets are information asymmetry, feedback trading, institutional risk management systems, market manipulation and size of firms listed on the securities market.

These above-discussed reasons for herding allude that herding is an inextensible phenomenon of a financial market but it is advocated that herding is not a continuous process and even if such behavior exists in a market its period is very short-lived because the rational investors counteract the signals herders bring along in a market (Froot, Scharfstein, & Stein, 1992) . So it can be said that herding is a short term phenomenon that disappears in the long term.

2.9 Consequences of Herding

Academicians and researchers presented the driving forces lying behind the herding behavior of investors from several viewpoints, there is a general agreement over the detrimental effects that herding behavior brings along in a financial market. These effects include substantial asset price movements, increased volatility, and financial market destabilization. It is these consequences, together with the need for strict policies that should align these problems that were of main importance in the growing body of literature

A wide range of damaging outcomes justifies that why herd instinct is an important topic that is of worthwhile to be debated. In terms of financial markets' movements, correlated trading behavior might have the power to let the market unstable (Demirer & Kutan, 2006) . The return on investment depends not on the amount of investment or the number of stocks but it is something related to the covariance among the stocks. Negatively correlated stocks are ideal for investment, as it reduces

systematic risk and idiosyncratic volatility. An increased degree of similar trading patterns narrows down the way towards diversification. It then might need more of assets within a portfolio of investors to reduce the risk, associated with the co-movement of assets, to the desired level. On the other hand, if investors do not have more assets, few assets are more at risk of correlated trading, mispricing and eventually low returns. (Baur, 2006; Caparrelli et al., 2004; Chang et al., 2000; Chiang & Zheng, 2010). Furthermore assets mispricing due this behavior results in failure of true price determination of assets and hence makes market inefficient (Devenow and Welch, 1996) by giving investment opportunities to the arbitrageurs and noise traders (Hwang & Salmon, 2004 ; Tan et al., 2008) . Conclusively herding behavior cause immense damage to the financial as well as social welfare as the mispricing it brings leads to the suboptimal decision making by individual as well as institutional investors and disastrous repercussions from the policymakers.

2.10 Contagious Herding

Researchers are also found to be interested in the spillover effects of herding among different markets. It means herding behavior together with its effects can easily be transmitted from one market to another. Therefore herding in one market can affect nearby other markets too. In this framework Boyer et al. (2006) documented that instead of market fundamentals', herding is one of the main reasons that spread out crises from one region to another. As in high volatility periods herding will be even larger, therefore one can say volatility has a multiplier effect on herding which does not reside only in one specific region, in fact, it just spills over. Similarly, Billio & Caporin (2010) found pieces of evidence of contagious herding between Asian and American stock markets. They added that the principal factor underlying this contagious herding is international investors. This study is focusing on many other aspects of herding other than its

spillover effects. Academicians may through a light in this area that how herding and its effects in one market diffuse in the neighboring markets.

2.11 Herding in PSX

There are studies which investigated herding behavior in Pakistani equity market. The study of Javaira& Hassan (2015) examines herding behavior during the year 2002- 2007 in PSX by analyzing monthly as well as daily frequency data of selected companies listed in KSE-100 index. By analysing the statisitics with the use of CSSD and CSAD measures,they found absence of herding behavior in different market asymmetries likeiwse volatility,market returns and liquidity . Moreover they found that market is not even efficient because it is not following the rational asset pricing model .

2.12 Research Gap

After reviewing the literature it has been found that certain areas have been neglected from the viewpoint of herding. Since long herding had explored with many different dimensions in the non-financial sector of different economies but the financial sector has not been yet explored. The financial system serves as an intermediary between the population that has savings and the firms and households that need financing. The transfer of funds can happen through two main channels. Savings can accumulate in the banking system in the form of bank deposits and then the banks give credits. The second channel is the stock market. In that case, people invest their money directly by acquiring ownership in firms. Each share represents part ownership in a company.[3]Henceforth banking sector has its importance due to its dual nature of comprising both channels i.e investments (in the form of investments in banking stocks)

[3] International Banker, Authoritative Analysis on International Banking.

and savings(in the form of deposits that are later also used as investments after giving credits). As the banking sector is one of the main tenets of the financial sector of Pakistan, therefore, present research extends the empirical literature of herding in banking stocks.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Introduction

This chapter provided the methodology to be followed throughout the research. The chapter covered the research design, area of the study, data collection method, data analysis techniques, dependent and independent variables, econometric technique and estimation methodology.

3.2 Research Design

The study adopted a quantitative comparative design which is all about quantifying relationships between variables. The aim of quantitative research was to determine the relationship between an independent and a dependent variables outcome in a population. In particular, the study used quantitative research design because it sought to determine herd behavior in different market conditions and in the presence of different macroeconomic variables.

3.3 Area of the Study

This study is conducted in Pakistan as we want to find out that whether herding exists in Pakistani market or not.

3.4 Sampling Design

The study employed secondary method to collect data in order to facilitate data collection process. The advantage of the secondary data is that, especially a government agency has collected the data, incredible amounts of time and money went into it. It's

probably highly accurate. The secondary data also saves time and is less costly in collection therefore, the research has relied on this method.

3.5 Sample Size

The study selects the sample size from January 2009 –June 2018 almost 10 years because they are more current and is specific for our study. Furthermore, this time frame is more suitable for this study because not every bank's data is available before 2009.

3.6 Data

To investigate herding behavior in Pakistani bank stocks, this study will take 20 commercial banks listed in Pakistan Stock Exchange. The data we need for analysis is closing prices and trading volumes of the bank stocks from January 2009 –June 2018 for both daily and monthly samples.. As the current study has taken data over time, hence it is fairly said that the data is time series. Moreover for monthly analysis macroeconomic variables observations are also taken and macroeconomic time series might be stationary or not therefore using the time series data first of all stationarity of all the series is checked before analyzing.

3.6.1 Dat a Collection Methods

The present study used secondary data as the financial data is readily available from the websites of PSX and Business recorder. The financial data is collected from PSX and Business recorder. Whereas the data related to macroeconomic variables i.e money supply, interest rate and inflation is taken from website of State Bank of Pakistan. Thus there is no need to use primary data collection method because sample size is for 10 years which is available from different government websites.

3.6.2 Dependent Variable

Christie & Huang (1995) proposed CSSD as a measure of herding and Chang et al (2000) proposed CSAD for the measurement of herding. We use both of these two dependent variables one after another in order to check and confirmation of our results.

3.6.3 Independent Variable

To check herding in banking stocks, average market stock returns were used as an independent variable in different ways as an authentic measure. Moreover to check the asymmetric effects trading volume and stock volatility variables are used. In addition to this, to capture the effects of macroeconomic variables, certain economic variables are also used as independent variables. These are interest rate, inflation,and money supply.

3.7 Methodology

3.7.1 Stationarity and Unit Root Test

A Stationarity test was conducted by the study to determine the statistical properties of the time series data used in the study. The main objective was to ensure that the data is stationary. A stationary time series data is one that exhibits near constant mean, variance and autocorrelation. Stationarity was examined by performing a unit root test. A unit root is a feature of processes that evolves through time that can cause problems in statistical inference involving time series models. Augmented Dickey Fuller test is applied to check the stationarity for each variable.

3.7.2 Econometric Technique

Ordinary least square (OLS) technique, that helps to determine the relationship between independent variables and dependent variable, is used in this study to check herding behavior. As the data is time series and for OLS to apply all the variables must

be stationary, so first, we apply the unit root test for all the data series. As a justification for this technique, Maddala [17] identified that ordinary least square is more robust against specification errors than many of the simultaneous equation methods. Also, predictions from the equation estimated by ordinary least squares often compare favorably with those obtained from equations estimated by the simultaneous equation method. Among other reasons is the simplicity of its computational procedure in conjunction with optimal properties of the estimates obtained and these properties are linearity, unbiased and minimum variance among a class of unbiased estimators. Further, the OLS technique is popular in studies that use time-series data and particularly past studies that have investigated herding behavior in different market conditions and the relationship between macro-economic variables and herding behavior. The popularity of this method is since it returns accurate findings and it can perform regression using stationary time series data.

3.7.3 Estimation Methodology

Describing about the rational asset pricing model Christie & Huang (1995) stated that the model assumes as the absolute value of market return increases, dispersion in returns also increases. Empirical investigation of the American market provide evidences of deviation from this rational behavior and it was concluded that the presence of herding behavior is a failure to maintain the assumption of rational asset pricing model and hence the market is no more rational. Therefore analysis of cross sectional standard deviation of returns was put forward as in order to determine herding behavior.

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

where :

$\boldsymbol{R_{i,t}}$shows the observed return of stock of bank *i*on day *t*

$\boldsymbol{R_{m,t}}$shows the average of returns of N stocks included in market portfolio on day *t*

As stated earlier that herding begins when investors start overlooking the information they themselves get about an investment while considering other investors as more informed and better decision makers therefore give more attention to the others actions. Eventually to do as good as others are doing in the market they initiate an adaptive strategy of following others and forms herd of investors making similar decisions. This situation, which usually arises in extreme market movements or in market stress, leads to a decrease in variations in the returns in the market because investors are investing (disinvesting) in same stocks in the course of this replication process. At last this whole process give rise to convergence of asset returns to market's average return. Hence dispersion in returns decreases with an increased participation in the market.

Christie & Huang (1995) having these suppositions gave the model below to estimate herding in extreme market stress:

$$\boldsymbol{CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \epsilon_t} (2)$$

where:

$\boldsymbol{D_t^L}$= 1, if the market return on day *t* lies in the extreme lower tail of the return distribution, or zero otherwise

$\boldsymbol{D_t^U}$= 1, if the market returns on day *t* lies in the extreme upper tail of the return distribution, or zero otherwise

These dummies are introduced in order to capture the effect of asymmetric investor behavior in both upward and downward extreme conditions. It could always be a point of discussion what "extreme movements" are but here in this specific condition 1 or 5

percent of the of the upper and lower tails of return distribution are declared as extreme movements.

Presence of herding behavior is confirmed if the beta coefficients i.e$\boldsymbol{\beta^L}$&$\boldsymbol{\beta^U}$ come out to be negative and significant statistically. On the contrary if the beta coefficients $\boldsymbol{\beta^L}$&$\boldsymbol{\beta^U}$ come out to be statistically significant with a positive value of coefficient it means that with extreme market movements the variations among the stock returns will widen. Such an expansion in variations is not only a proof of non-conformity with the herding behavior instead higher dispersion among stock returns is consistent with classical rational asset valuation model

Despite the fact that cross-sectional standard deviation of returns is to some extent a fairly intuitive measure that is used to examine the intensity of herding behavior in equity market but it may loss robustness in case of occurrence of outliers (Economou *et al*, 2010) as it is calculated by squared return deviations (Arjoon 2017).

Chang et al 2000 suggested cross-sectional absolute deviation of returns as an inception stage of the herding investigation model, with a view to overcome the estimation challenges due to the presence of any outlier. They laid the foundation of their model on Christie & Huang (1995), model but unlike Christie & Huang (1995) a non-linear regression was suggested aiming at determining the herding behavior by observing the relationship between the average market return and the dispersion in equity returns.

As rational asset pricing model predicts that as the value of the market return increases dispersion in return also increases i.e dispersion is an increasing function of market return. While implying cross absolute deviation of returns as a better measure to estimate herding Chang et al 2000 argued that during the extreme market movements ,the moment when herding(making crowds by engaging in collective behavior while

suppressing own beliefs)begins in a market the traditional relationship discussed by CAPM between stock returns and dispersion become invalid. Instead the relationship could increase or even decrease in a nonlinear fashion.

Herding results in a convergence of equity returns to the market return. Therefore in times of extreme market movements presence of herding leads to a less than proportional increase in dispersion or even a decrease in the absolute deviation of the returns which is measured by the equation

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

The second method is based on general quadratic relationship between CSADt and Rm,t formulated by Chang et al. (2000), this non-linear relationship is modeled as follows:

$$\boldsymbol{CSAD_t = \alpha + \gamma_{1|R_{m,t}|} + \gamma_2 R^2{}_{m,t} + \epsilon_t} (\mathbf{4})$$

Chang et al. (2000) argued that investors are found to herd in the market if the non-linear coefficient γ2 come out as significantly negative at a given level of significance. Whereas a significantly non-negative (positive) γ2 shows that the market is free from herd instinct.

According to Gleason et al. (2004), if herding appears in the time of stress in the market the non-linear component introduced by change et al 2000 for determining CSAD can also be empirically tested for CSSD. For a progressive investigation of herding Gleason et al. (2004) proposed further two models in which he just swap the right hand site of Equations (2) and (4) that are the dependent variables of the equations.

$$\boldsymbol{CSAD_t = \alpha + \beta_1^U D_t^U + \beta_2^L D_t^L + \epsilon_t} (\mathbf{5})$$

$$\boldsymbol{CSSD_t = \alpha + \gamma_{1|R_{m,t}|} + \gamma_2 R^2{}_{m,t} + \epsilon_t} (\mathbf{6})$$

It has been commonly observed that when there is a decline in market, percentage increase in dispersion with respect to aggregate market returns is lower. It seems like investors conform with one another in order to avoid losses. Similarly in times of rising market, percentage increase in dispersion with respect to aggregate market returns is higher which shows a diverse behavior in a market rather than a convergence.

Therefore for both upward and downward market trends estimation of herding must be done with discrete independent equations with a view to capture the effects of asymmetry in the market during bullish and bearish trends.

In particular, the new framework of equations is developed as below:

$$\boldsymbol{CSAD_t^{Up} = \alpha + \gamma_1^{Up}\left|R_{m,t}^{Up}\right| + \gamma_2^{UP}\left(R_{m,t}^{Up}\right)^2 + \epsilon_t \text{if} R_{m,t} > 0 (7) CSAD_t^{Down}}$$

$$\boldsymbol{= \alpha + \gamma_1^{Down}\left|R_{m,t}^{Down}\right| + \gamma_2^{Down}\left(R_{m,t}^{Down}\right)^2 + \epsilon_t \text{if} R_{m,t} < 0 (8)}$$

where$\boldsymbol{R_{m,t}^{Up}}$($\boldsymbol{R_{m,t}^{Down}}$)represent the equal-weighted portfolio returns during the bullish (bearish) market trends at time t, and $\left(\boldsymbol{R_{m,t}^{Up}}\right)^2$ [$\left(\boldsymbol{R_{m,t}^{Down}}\right)^2$]is the squared value of equal weighted portfolio to investigate the non-linearity in market returns when market is rising (declining).$\boldsymbol{CSAD_t^{Up}}$($\boldsymbol{CSAD_t^{Up}}$)is the CSAD at time t consequent to rising (declining) market returns.

Empirical investigation shows that in equity markets liquidity is one of the key factors affecting information environment. Chordia et al. (2008) and then Tian et al. (2015),both studies proposed that higher liquidity will increase information flow and hence informational efficiency. Conversely researchers like Baker and Wurgler (2006) and (Arjoon & Bhatnagar, 2017). Deuskar*et al. (*2008) argued that liquidity has strong relationship with noise trading and sentiment investments. As liquidity is linked with information flow and noise trading so it is crucial to analyze its role in herding behavior.

Therefore this study attempts to find herding during both high and low liquidity. Trading volume is a common proxy used for liquidity. This study also examines possible asymmetric effects during periods of high or low volume. . For the daily returns, if on a specific day trading volume Vt is higher(lower) than last two hundred days moving average then the trading volume is assumed to be high(low) for that specific day. In a similar way, five months moving averages is used for the monthly sample. The herding regression is estimated separately for high and low trading volumes. Specifically, this set of equations for high as well as low trading volume is represented as:

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

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

Where $\boldsymbol{R_{m,t}^{V-high}}$refers to market returns when trading volume is high and $\boldsymbol{R_{m,t}^{V-low}}$ represent the low trading volumes state. A negative coefficient which is significant shows that when trading volume increases dispersion between stocks decreases. This result indicates a convergence of individual equity security return to the market returns. Therefore significantly negative coefficients γ2 signifies the presence of herding in market with respect to trading volumes.

Furthermore Investors may be more prone to discard their own private information and skill sets to follow the market consensus during periods of risk and uncertainty.

With respect to market volatility herding has an asymmetric effect and this study tries to investigate those effects. According to normal buying selling behavior, investors used to buy when prices are low and sell when prices get high. Hellwig (1980) was the one who pin points that it is the asymmetry of information that aggravates market

volatility. Such uninformed trading, by simply following others in the market drive volatility The rationale behind his argument was that irrational investors start buying at high prices and sell at low prices without knowing further changes in the prices . Therefore, increases volatility due to irrational trading results may lead to herd formation. Similar to our analysis of trading volume, we examine possible asymmetric effects during periods of high or low volatility. For the daily returns, if on a specific day market volatility δt is higher(lower) than last two hundred days moving average then market volatility is assumed to be high(low) for that specific day. In a similar way, five months moving averages is used for the monthly sample. For the empirical investigation of possible asymmetric effects the following equations are devised:

$$\boldsymbol{CSAD_t^{\delta^2,high} = \alpha + \gamma_1^{\delta^2,high}\left|R_{m,t}^{\delta^2,high}\right| + \gamma_2^{\delta^2,high}\left(R_{m,t}^{\delta^2,high}\right)^2 + \varepsilon_t (11)}$$

$$\boldsymbol{CSAD_t^{\delta^2,low} = \alpha + \gamma_1^{\delta^2,low}\left|R_{m,t}^{\delta^2,low}\right| + \gamma_2^{\delta^2,low}\left(R_{m,t}^{\delta^2,low}\right)^2 + \varepsilon_t (12)}$$

The performance of the equity market is a driving force in driving a country's economic progress and to achieve this progress macroeconomic variables used to give policy considerations. Therefore the equity market along with the changes in the macroeconomic variables largely determines the pace that with what speed the policy steps changes can be widely dispersed within the entire country. This means change in macroeconomic variables changes the equity returns (Akhtar 2006). To check the potential impact of macroeconomic indicators on investors' rationality, this research inculcate KIBOR rate as an approximation for interest rate, money supply (M_1) and inflation rates to the herding regression. These indicators have possible considerations for the prices of assets in a financial market. Interest rate fluctuations is the cause of changes in the market value of the stocks as well as companies ,a share's fair value is its projected future cash flows discounted to the present using the investor's required

rate of return. Keeping every other thing constant a fall in interest rate results in a subsequent fall in required rate of return and therefore rises share value. Money supply is an indicator, indicating how much liquidity is available to investors. a\n increase level of liquidity shows that there are more investment resources and in result it increases the demand in stocks and it ultimately give a rise in stock prices. Therefore, the assumption is that money supply positively impacts equity returns.

Moreover the demand of domestic/local assets increases, with an increase in the stock prices, which leads local currency to get appreciated. Similarly, depreciation in domestic currency increases the export of a country making local firms more competitive, and raises their stock prices. Therefore, it is observed that depreciation in home currency leads to variation in equity prices.

There are few researchers who made efforts to examine the importance of different macroeconomic variables in making the market efficient. The study related to the money supply and market efficiency ,proposed by Husain & Mahmood (1999), states that market returns are not responsive to any information regarding money supply. One study reported market efficiency with respect to money supply. Any change in the money supply is frequently adjusted in the stock returns, which shows a significant impact of money supply on stock prices. (Nishat &Mustafa 2002).They also tried to find a correlation between equity returns and exchange rates and found no evidence of such linkage. In a similar way Hasan and Javed (2009) tested four different monetary variables including money supply, inflation rate, interest rates and exchange rates that whether these variables bring about any change in stock returns and found a significant impact of these variables on stock prices movements. To bring about economic as well as financial stability in a country monetary policy is used as a major tool to stabilize the Pakistani economy. These fundamental monetary variables play

significant role and found to affect the equity market movement. In order to calculate the dispersions among the equity returns i.e cross-sectional absolute deviation (CSAD) due to herding behavior given the presence of macroeconomic factors, this study employ ,previously discussed, three major macroeconomic indicators. If $\boldsymbol{R_{m,t}}$become statistically insignificant and $\boldsymbol{R^2{}_{m,t}}$becomes insignificant and non-linear in the presence of the above mentioned macroeconomic variables then changes in the $\boldsymbol{CSAD_t}$ is expected to be due to these fundamentals rather then herding. Therefore, these macroeconomic variables allow us to take into account the effect of macroeconomic information while determining the level of herding through:

$$\boldsymbol{CSAD_t = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 R^2{}_{m,t} + \varphi_1 i_t + \varphi_2 \pi_t + \varphi_3 M_t + \varepsilon_t} (\mathbf{13})$$

CHAPTER 4

RESULTS AND FINDINGS

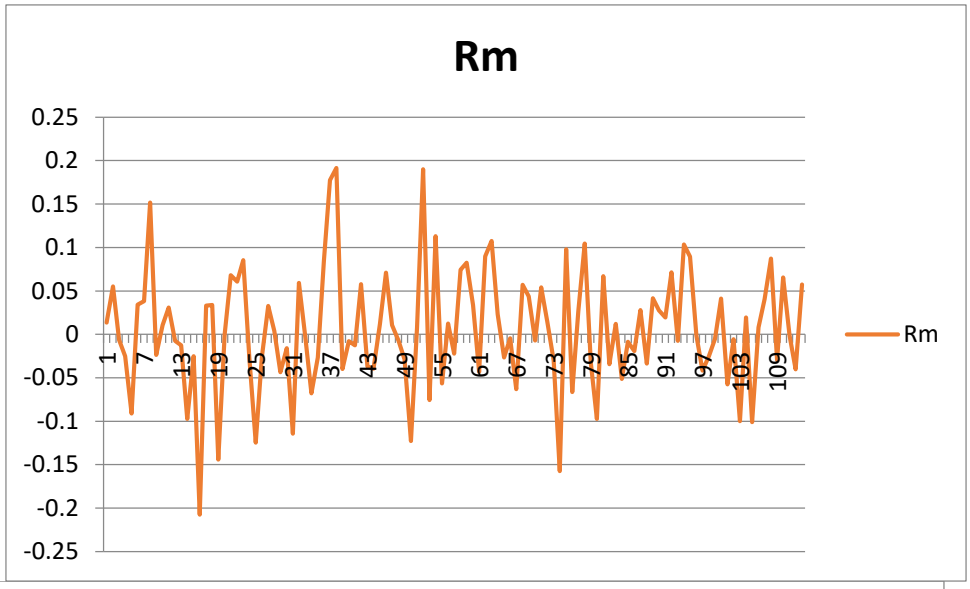
4.1 Unit Root Test

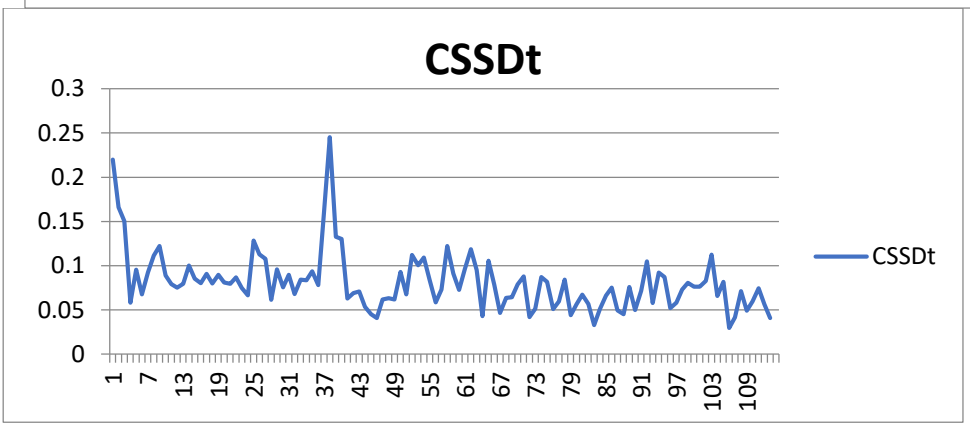
In time series analysis stationarity of series must be checked before deciding any test further.it is confirmed from the table that all the p-values are less than 0.05 which shows that all series are stationary with a constant mean and variance. Therefore we can use simple regression method that is OLS.

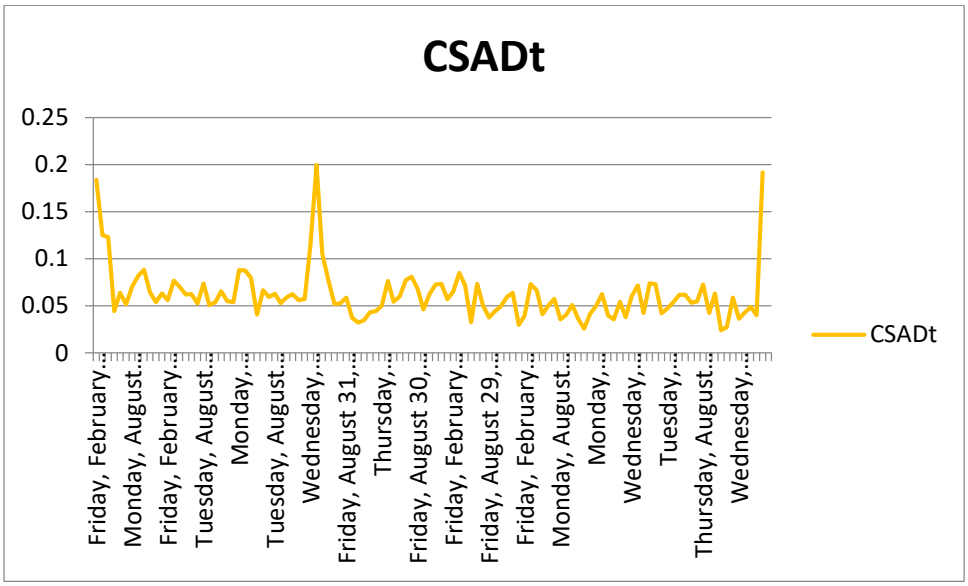
Table 1a: Unit root of Variables

Unit Root Of Variables	
Variables	**ADF**
Maket Return	-10.27 (0.0000)
Abs Market Return	-1.94 (0.05)
Trading Volume	-7.5555 (0.0000)
Cross Sectional Absolute Deviation	-7.22 (0.0000)
Cross Sectional Standard Deviation	-6.916 (0.0000)
Interest Rate	-1.94 (0.0504)
Inflation	-9.56 (0.0000)
Money Supply	-2.177 (0.02)

Following are the graphs which also confirm that the return series are mean reverting and are stationary.







4.2: Descriptive Statistics

Table 1b presents descriptive statistics of average returns, cross-sectional standard deviation, and cross-sectional absolute deviation of the banking sector of

Pakistan for both daily and monthly data. Daily and monthly data estimations took 2355 daily observations and 113 monthly observations from all the commercial banks listed in the stock exchange of Pakistan having a time period spans from January 2nd, 2009 to June 29th, 2018.

Table 1b Descriptive statistics for the period of 2009-2018

	Daily			Monthly		
STATISTIC	***Rm***	***CSSDt***	***CSADt***	***Rm***	***CSSDt***	***CSADt***
Mean	0.0002	0.0223	0.0158	0.0048	0.0814	0.0604
Standard Deviation	0.0136	0.0102	0.0067	0.0686	0.0327	0.0256
Kurtosis	5.1956	8.7902	8.0762	0.9381	7.4193	11.5684
Skewness	0.1347	2.2856	2.1282	0.0172	2.1121	2.7297
Minimum	-0.0821	0.0054	0.0038	-0.2076	0.0296	0.0241
Maximum	0.0972	0.1091	0.0693	0.1917	0.2452	0.1995
N	2355.0000	2355.0000	2355.0000	113.0000	113.0000	113.0000

The above table shows that the average daily individual market return is 0.0002 with a standard deviation of 0.0136, whereas for monthly data average individual market returns is 0.0048 with a standard deviation of 0.0686. For daily samples, the mean value of CSSD is 0.0223, greater than the average value of the series CSAD that is 0.0158, however, CSSD series has a standard deviation of 0.0102 i.e 1.02% ,higher than the CSAD series' standard deviation, that is 0.67%. Thus it is deduced that cross-sectional absolute deviation (CSAD) is less volatile than cross-sectional standard deviation (CSSD). Moreover, for a monthly sample, the mean value of CSSD is 0.0814 greater than CSAD i.e 0.0604, while the standard deviation for CSSD is 3.27% higher than that of CSAD i.e 2.56%. Statistics of average market returns (Rm) can be negative but the statistics of cross-sectional absolute deviation (CSAD) as well as Cross-sectional standard deviation (CSSD) are always strictly positive. The reason behind this is that CSAD takes absolute values ignoring the signs and CSSD values are derived after taking the square root. So both CSAD and CSSD are always positive. However, Rm is simply an average of the individual market returns of the banks which can be negative. Overall, the mean returns for Rmt, CSSDt, and CSADt are positive, suggesting that on average, the commercial banks have positive average returns over

the sample period. The average market return for daily data is smaller than that of monthly data. According to expectations the variation in return increases with an increase in return intervals. Following this, the table also depicts that the standard deviation measure is higher for monthly data than for daily data. Values estimated for mean and standard deviation through CSAD and CSSD are different. Mean and standard deviation measures for CSAD are lower than those of CSSD. This shows that CSAD is less volatile and less sensitive to outliers / abnormal returns as compare to CSSD, as indicated by Granger & Ding (1995) . Statistics clearly show that for both daily and monthly samples, all the series Rm, CSSDt and CSADt have positive skewness values, which clearly indicates little extreme minimum values. Kurtosis tells about the distribution shape which can be of three different types. If the distribution is normally distributed it is said to be mesokurtic and its kurtosis is 3.If the kurtosis is less than 3, the distribution is named as platykurtic and is characterized by thin tails and fewer peaks. On the other hand if kurtosis than 3, distribution is leptokurtic characterized by heavy tails and high peaks around the mean. Summary statistics show that the kurtosis values for both monthly and daily series are greater than 3 indicating higher distributions than a normal distribution. Regression estimates for the calculation of herding behavior, at 1% level of significance, during extreme movements in the market, across all commercial banks listed in PSX is given in Table 2a.

Table 2 a: Regression estimates in extreme market movements using CSSD

$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \epsilon_t$ **at 1% criterion**

	1% criterion					
SAMPLE	α	β^U	β^L	Adj.R^2	**F**	**Sig**
DAILY	0.0220	0.0021	0.0219	0.0440	55.1072	0.0000
t-stat	105.9207	1.0066	10.4595			
p-value	0.0000	0.3142	0.0000			
MONTHLY	0.0804	-0.0230	0.1394	0.1507	10.9373	0.0000
t-stat	28.1281	-0.7587	4.6081			
p-value	0.0000	0.4496	0.0000			

Two sets of dummy variables have been constructed i.eβ^L&β^U which denotes extreme market movements, downwards and upwards respectively. The purpose of these variables is to check that how investor behavior is effected by extreme market conditions. In line with the methodology of Christie & Huang (1995), Chang et al. (2000) and Gleason et al. (2004) . 1% and 5% criterion is used in order to confine dummy variables to 1 % and 5% of the upper and lower tails of the commercial banks return distribution. The coefficients which are positive and statistically significant are supporting rational asset pricing model that during market stress variations in returns increases as the individual bank returns vary in their sensitivity to the market returns. On the other hand if the coefficient comes out to be negative and statistically significant, it denotes herding behavior.

Results of the regression for daily returns, shows that in extreme upward market movements β^U and is 0.0021 with a p-value of 0.3142, the positive coefficient shows no herding behavior. Similarly value of $\beta^L$is 0.0219 with a p-value of 0.0000 which clearly shows that market is rational. Moreover for monthly sampleβ^U value is -0.0230 but is not significant with a p-value of 0.4496, indicating no herding behavior. For downward extreme movements the value of β^L is 0.1394 with a p- value of 0.0000 which is significant, this shows that as it increases cross sectional standard deviation

also increases which means there is no convergence between individual security returns and average market returns during downward movements. These results are consistent with results of (Christie & Huang, 1995)for the stocks of the US and get no clues of herding for both 1% and 5% criteria.Regression estimates for the calculation of herding behavior using CSSD at 5% level of significance, during extreme movements in the market, across all commercial banks listed in PSX is given in Table 2b.

Table 2b: Regression estimates in extreme market movements using CSSD $CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \epsilon_t$at 5% criterion

	5% criterion					
SAMPLE	α	β^U	β^L	adj.R^2	**F**	**Sig**
DAILY	0.0216	-0.0007	0.0136	0.0839	108.8402	0.0000
t-stat	101.7869	-0.7437	14.6759			
p-value	0.0000	0.4571	0.0000			
MONTHLY	0.0800	-0.0186	0.0463	0.1070	7.7090	0.0007
t-stat	26.0222	-1.4323	3.5699			
p-value	0.0000	0.1549	0.0005			

Extreme market movement upwards when estimated at 5%, shows that β^U for daily data is -0.0007 with a t-value of -0.7437 which is insignificant. Similarly β^U for monthly data is -0.0186 with a t-value of -1.4323 which is again insignificant, indicating no herding behavior. This result is similar to the results of (Javed et al., 2001),they too found an insignificant negative coefficient but that was during extreme downward movements. They argued that though the negative value is not significant yet it is showing chance of presence of herd instinct. It is reasonable to say that few investors might follow one another, in order to reap gains but they do not have a significant impact on the overall market or this might be due to certain inefficiencies in the market (El-shiaty & Badawi 2014).For downward movements, for daily sample, the coefficient β^L has value of 0.0136 with a t value of 0.0000 which is significant. On the other hand β^L for monthly data is significant with t-value of 0.0005 where coefficient has a positive value of 0.0463. Regression estimates for the calculation of herding

behavior using CSAD at 1% level of significance, during extreme movements in the market, across all commercial banks listed in PSX is given in Table 3a

Table 3a: Regression estimates in extreme market movements using CSAD $CSAD_t = \alpha + \beta_1^U D_t^U + \beta_2^L D_t^L + \epsilon_t$ at 1% criterion

	1% criterion					
SAMPLE	α	β^U	β^L	**adj.R^2**	**F**	**Sig**
DAILY	0.0156	0.0011	0.0185	0.0735	94.3099	0.0000
t-stat	116.2362	0.8493	13.7155			
p-value	0.0000	0.3958	0.0000			
MONTHLY	0.0595	-0.0188	0.1242	0.1999	14.9885	0.0000
t-stat	27.4237	-0.8176	5.4062			
p-value	0.0000	0.4154	0.0000			

Coefficient estimates for upward market movements β^U are 0.0011 and -0.0188 with t-stat values as 0.8493 and 0.4154 respectively. Similarly the coefficients for downward market movements, for monthly sample come out as 0.0185 and 0.1242 with t-stat values as 13.7155 and 5.4062 respectively. Adj. R^2 of the model is 7.35% for daily data, whereas for monthly data it is 19.99% which is higher than the previous models of CSSD. This study consistent with the previous studies (Chang et al., 2000; Gleason et al., 2004; Kumar, Bharti, & Bansal, 2016) shows that there is no clue of herding during extreme market movements, using CSAD. Regression estimates for the calculation of herding behavior using CSAD at 5% level of significance, during extreme movements in the market, across all commercial banks listed in PSX is given in Table 3b.

Table 3b: Regression estimates in extreme market movements using CSAD $CSAD_t = \alpha + \beta_1^U D_t^U + \beta_2^L D_t^L + \epsilon_t$ at 5% criterion

SAMPLE	α	β^U	β^L	**adj.R^2**	**F**	**Sig**
DAILY	0.0152	-0.0006	0.0111	0.1317	179.4601	0.0000
t-stat	112.6318	-1.0504	18.8348			
p-value	0.0000	0.2936	0.0000			
MONTHLY	0.0591	-0.0147	0.0394	0.1266	9.1143	0.0002
t-stat	24.8777	-1.4612	3.9234			
p-value	0.0000	0.1468	0.0002			

The above table shows that at 5% in falling market conditions coefficient for daily data is -0.0006 with a p-value of 0.2936 which is insignificant. Similarly for monthly data β^U is negative i.e -0.0147, with a p-value of 0.1468, which is again insignificant. Both of these show that there is no herd formation in the market in upward trends. The coefficients for downward market movements show significant positive values. For daily sample β^L is 0.0111 having a p-value of 0.0000 and for monthly sample it is 0.0394 with a p-value of 0.0002.This shows that the assumptions of the rational asset pricing model is followed that dispersion increases with an increase in the value of the coefficient β^L.

The same results of tables 2 and table 3 confirm the proposition of Gleason et al. (2004) that whatsoever the measure of dispersion i.e CSSD or CSAD is used there will be no impact on dispersion and there is no evidence of herding. The only difference which is quite evident is the explanatory power of the model which is higher in CSAD model than CSSD model. Regression estimates for the calculation of herding behavior by CSSD, using a non-linear model, across all commercial banks listed in PSX is given in Table 4a.

Table 4a: Non-linearity Regression estimates, using CSSD

$$CSSD_t = \alpha + \gamma_{1|R_{m,t}|} + \gamma_2 R^2{}_{m,t} + \epsilon_t$$

SAMPLE	α	γ_1	γ_2	adj.R^2	F	Sig
DAILY	0.0179	0.4791	-0.6063	0.2842	266.6759	0.0000
t-stat	53.7581	11.3746	-0.7298			
p-value	0.0000	0.0000	0.4656			
MONTHLY	0.0745	-0.0520	2.0456	0.3693	12.4127	0.0000
t-stat	13.0108	-0.2895	1.9896			
p-value	0.0000	0.7728	0.0491			

Following Chang et al. (2000) this study also aims to check the non-linear relationship between the return dispersion and market return, hence a quadratic term is

added $i.e\ R^2{}_{m,t}$. The coefficient γ_1 for daily returns owes a positive value of 0.4791 with a corresponding p-value of 0.0000, whereas for monthly returns γ_1 have a value of -0.0520 insignificant value having a respective p-value of 0.7728 which is insignificant. Both of these scenarios show no herd behavior. Similarly, the coefficient for the non-linear term $R^2{}_{m,t}$ comes out to be -0.6063 at a p-value of 0.4656 for daily data and for monthly sample this coefficient has a positive value of 2.0456 given a p-value of 0.0491 which shows a departure of herding behavior and conformity to the traditional model of asset pricing. Adj. R^2 value is 28.42 and 36.93 for daily and monthly sample respectively. Likewise, F-stat of the regression is 266.6759 and 12.4127 for daily and monthly samples respectively. From the high value of R^2 and F-stat it can be said that this model is better than the previous models and its explanatory power is also high. Moreover, it does not have the estimation problems for the outliers as it is not sensitive to outliers. Regression estimates for the calculation of herding behavior by CSAD, using a non-linear model, across all commercial banks listed in PSX was given in Table 4b:

Table 4b: Non-linearity Regression estimates, using CSAD

$$CSAD_t = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 R^2{}_{m,t} + \epsilon_t$$

SAMPLE	α	γ_1	γ_2	adj.R^2	F	Sig
DAILY	0.0124	0.3578	-0.3077	0.5501	393.6190	0.0000
t-stat	59.7046	13.5613	-0.5914			
p-value	0.0000	0.0000	0.5543			
MONTHLY	0.0551	-0.0290	1.4640	0.5497	10.8585	0.0000
t-stat	12.1512	-0.2039	1.7993			
p-value	0.0000	0.8388	0.0747			

In the table above it is observed that the value of F-stat has significantly improved i.e 393.6190 and adj R^2 for this model is 55.01% and 54.97%, highest from all previous models, for both daily and monthly data respectively. For daily data γ_1 has

a value of 0.3578 with a p-value of 0.0000, whereas for monthly data the value of the coefficient γ_1 is -0.0290 having a p-value of 0.8388.So, these results show that market is far away from herding. Apart from this when we see the co-efficient of non-linear term ($R^2{}_{m,t}$) which is γ_2 , it is easily observed that for daily data it has a value of -0.3077 with a p-value of 0.5543.On the other hand for monthly data it has a value of 1.4640 having a p-value 0.0747. All the coefficients are either positively significant or simply insignificant. Both of these results show no herding behavior and confirm the presence of certain inefficiencies in the market. Such a deduction is primarily made by Demirer et al. (2006) for certain Asian, European and African markets that inefficiencies are evident as the measure of dispersion is continuously increasing with an increasing rate. This is true for the banking sector of Pakistani market too. Table 5a is reporting asymmetric effects of herding behavior in situations of rising prices.

Table 5a: Herding behavior; Asymmetric effect of market returns (Result estimation during rising market conditions.(Rm,t>0))

SAMPLE	α	γ_1^{up}	γ_2^{up}	adj.R^2	F	Sig
DAILY	0.0131	0.3568	0.5355	0.2921	239.0342	0.0000
t-stat	43.2439	9.7657	0.7705			
p-value	0.0000	0.0000	0.4412			
MONTHLY	0.0520	-0.0308	2.1605	0.2474	10.0382	0.0002
t-stat	6.3588	-0.1299	1.6441			
p-value	0.0000	0.8972	0.1061			

γ_1^{up} and γ_2^{up} are coefficients that tell us about the investigation of herding behavior in rising prices. For daily data γ_1^{up} , states a value of 0.3568 with a t-value of 9.7657, shows an absence of herding behavior whereas for γ_2^{up} the value is also positive 0.5355, Adj.R^2 is 29.21 % and F-stat of the regression model is 239.0342.On the other hand for monthly data the value of γ_1^{up} is -0.0308 with a p-value 0.8972 which is insignificant and γ_2^{up} has a value of 2.1605 with a p-value of 0.10 which is significant ,adj.R^2 is 24.74% and F-stat of the regression model is 10.0382. Since both the

coefficients γ_1^{up} and γ_2^{up} are not statistically significant, the study cannot determine the presence of herding during up market conditions, for both daily and monthly samples. These results comply with the results of (Yousaf, Ali, & Shah, 2018) who also found a denial of herding behavior in the rising market situation. Table 5b is reporting asymmetric effects of herding behavior in situations of falling prices.

Table 5b: Herding behavior; Asymmetric effect of Market returns (Result estimation during falling market conditions.(Rm,t<0))

SAMPLE	α	γ_1^{down}	γ_2^{down}	adj.R^2	F	Sig
DAILY	0.0117	0.3648	-1.5847	0.2073	157.7393	0.0000
t-stat	42.0856	9.7078	-2.0525			
p-value	0.0000	0.0000	0.0403			
MONTHLY	0.0567	0.0268	0.3288	0.0062	1.1741	0.3169
t-stat	12.6173	0.1753	0.3652			
p-value	0.0000	0.8615	0.7164			

In the above table γ_1^{up} and γ_2^{up} are coefficients that tell us about the investigation of herding behavior in falling prices. For daily data γ_1^{up} , states a value of 0.3648 with a t-value of 9.7078, shows an absence of herding behavior whereas for γ_2^{up} the value is -1.5847 with a t-value of -2.0525.The γ_2^{up} for daily data hence shows a herding behavior in the market during falling prices. El-shiaty & Badawi (2014)while collecting proofs of herding in Egyptian stock market proposed that if γ_1^{down} is positive, but $\gamma_2^{down}$is negative then this is an indicator that CSAD is increasing at a decreasing rate with the returns of the market which the Chang et al. (2000) model would also interpret as herding. But for monthly data γ_2^{down} is insignificant with a value of 0.3288,this shows no herding behavior posing that on a long term basis information is spreading well i.e averaged out. This shows inefficiency in the Pakistani market i.e prices do not adjust to the arrival of new information. Husain & Forbes (1999) while investigating weak form efficiency in the stock market of Pakistan reported that Pakistani stock market adjusted slowly to the new information. For daily data, Adj.R^2 is 20.73 % and F-stat of the

regression model is 157.73. Adj.R^2 of monthly sample is 0.62% and F-stat of the regression model is1.1741. Table 6a is reporting herding behavior during high trading volume.

Table 6a: Herding behavior; Asymmetric effect of Trading volume (Result estimation at high trading volume state)

SAMPLE	α	γ_1^{v-high}	γ_2^{v-high}	adj.R^2	F	Sig
DAILY	0.0144	0.2493	1.8244	0.2466	120.1162	0.0000
t-stat	35.3152	5.1110	1.7921			
p-value	0.0000	0.0000	0.0735			
MONTHLY	0.0483	-0.0404	2.2345	0.4532	16.7481	0.0000
t-stat	5.2979	-0.1675	1.8189			
p-value	0.0000	0.8679	0.0772			

In times of high trading volume this study attempts to check herding behavior and found that γ_1^{v-high} for daily data has a value of 0.2493 with a p-value of 0.0000 and value of γ_2^{v-high} is 1.8244 with a p-value of 0.0735.These results comply with traditional asset pricing models. Adj.R^2 of the data is 24.66 and f-stat is 120.1162.Similarly for monthly data γ_1^{v-high} has a value of -0.0404 with a p-value of 0.8679, this negative insignificant value for monthly sample also indicates that convergence among returns will not occur. Moreover the value of γ_2^{v-high} is 2.2345 with a p-value of 0.0722.As the coefficient is positive so, it can be said that herding behavior is absent. Table 6b is reporting herding behavior during state of low trading volume.

Table 6b: Herding behavior; Asymmetric effect of trading volume (Result estimation at low trading volume state)

SAMPLE	α	γ_1^{v-low}	γ_2^{v-low}	adj.R^2	F	Sig
DAILY	0.0114	0.3673	-1.6934	0.1920	170.5473	0.0000
t-stat	52.5023	10.1500	-1.6684			
p-value	0.0000	0.0000	0.0955			
MONTHLY	0.0485	0.2267	-0.5798	0.1192	5.7362	0.0050
t-stat	14.9563	2.0216	-0.8288			
p-value	0.0000	0.0472	0.4101			

The above table shows that in conditions of low market volume the coefficient for daily data $\gamma_1^{v-low}$is 0.03673 with p-value of 0.0000 which is significant. Similarly, for the monthly data the coefficient value is 0.2267 with a p-value of 0.0472, which is again significant. Both of these show that there is no herd formation in the market. Additionally for daily sample, γ_2^{v-low} is -1.6934 having a p-value of 0.0955 which is less than 0.1 so it is significant and it shows existence of herding behavior. For monthly sample it is -0.5798 with a p-value of 0.4101 i.e. insignificant. The monthly insignificant still negative value indicates an insignificant impact of investors that might herd in the market and it also shows that information average out in the long run. It is also evident in falling market situation.

These results are consistent with the findings of Javaira & Hassan (2015) that also found no herding behavior in the Pakistani stock market both high and low trading volume. This shows that the assumption of the rational asset pricing model is followed that dispersion increases with an increase in the value of the coefficient. Regression estimates to capture asymmetric effects of herding behavior due to market volatility, using a non-linear model, across all commercial banks listed in PSX is given in Table 7a.

Table 7a: Herding behavior; Asymmetric effect of Market volatility (Result estimation at high volatility state)

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

SAMPLE	α	$\gamma_1^{\delta-high}$	$\gamma_2^{\delta-high}$	adj.R^2	F	Sig
DAILY	0.0124	0.3135	1.4601	0.3035	202.3535	0.0000
t-stat	41.5141	7.5649	1.5577			
p-value	0.0000	0.0000	0.1196			
MONTHLY	0.0509	0.1006	0.8813	0.2620	9.1663	0.0005
t-stat	6.8270	0.4882	0.8229			
p-value	0.0000	0.6278	0.4150			

The results of the regression of this shows that the volatility coefficient $\gamma_1^{\delta-high}$,for daily data,has a significant positive value of 0.3135,contrary $\gamma_1^{\delta-high}$ for monthly data is also positive i.e. 0.1006.Additionally for the non-linear term the coefficient of volatility $\gamma_2^{\delta-high}$ in times of high volatility came out to be 1.4601 and 0.8813 for both daily and monthly data respectively. In the above table, all the coefficients are positive which means that in the times of fluctuating prices dispersion in individual returns increases from the average market returns. Therefore, in conformity with the previous studies it can be concluded from the results that herding behavior does not exist during high market volatility state. Adj R^2 for daily and monthly samples is 30.35% and 26.20% respectively.

Table 7b: Herding behavior; Asymmetric effect of market volatility (Result estimation at low volatility state)

SAMPLE	α	$\gamma_1^{\delta-low}$	$\gamma_2^{\delta-low}$	adj.R^2	F	Sig
DAILY	0.0118	0.3732	-0.7489	0.2260	151.5275	0.0000
t-stat	44.5487	9.4653	-0.7745			
p-value	0.0000	0.0000	0.4388			
MONTHLY	0.0494	0.0155	1.2271	0.0605	2.8337	0.0574
t-stat	12.6557	0.0798	0.6389			
p-value	0.0000	0.9367	0.5255			

The above table shows that Adj.R^2 for daily sample is 22.60% and f-stat has a value of 151.5275. On the other hand for monthly sample the value of $\gamma_1^{\delta-low}$ and

$\gamma_2^{\delta-low}$ are positive but insignificant and have values 0.0155 and 1.2271 respectively.Adj.R^2 for the monthly sample is 6.05% and F-stat is 2.8337.In low volatility, when there is less uncertainty in the market the coefficient $\gamma_1^{\delta-low}$ for daily data depicts a significant (0.0000) value of 0.3732 which ensures conformity to rational asset pricing model. It means1% increase in volatility increases the dispersion 37.32 %. The coefficient $\gamma_2^{\delta-low}$ has a negative value of -0.7489 but is insignificant with a p-value of 0.7745. This shows that there might be chances of violation of the rational asset pricing model, due to certain inefficiencies in the market that can gradually lead to volatility and hence irrationality arises (Ghufran, Awan, Khakwani, & Qureshi, 2016) while analyzing volatility in Karachi stock exchange reported that political scenario is one of the main factors that led market turbulent therefore increases volatility, which in turn increases uncertainty and hence to avoid uncertainty investors herd (Holmes et al, 2011).

It is worth mentioning here that Variance inflation factor is calculated for the last model which is eq (13), in order to check the multicolinearity between the regressors. Following results shows that multicolinearity does not exist among the macroeconomic variables as all the values are less than 10. Therefore we can estimate our eq (13)

Table 7c: Variance Inflation Factors

Variable	VIF
C	NA
ABSRM	8.519956
ABSRM_2	8.557280
KIBOR	8.473121
INFLATION	1.142969
M1	8.646002

Regression estimates to check the presence of macroeconomic variables on investor decision making behavior are given in table below:

Table 8: Impact of macroeconomic variables on herding behavior

$$CSAD_t = \alpha + \gamma_1 \left|R_{m,t}\right| + \gamma_2 {R^2}_{m,t} + \varphi_1 i_t + \varphi_2 \pi_t + \varphi_3 M_t + \varepsilon_t (13)$$

Sample	A	Υ_1	Υ_2	φ_1	φ_2	φ_3	adj.R^2	F	Sig
MONTHLY	0.0005	0.0400	1.0031	0.0040	0.0058	0.0000	0.2958	10.4103	0.0000
t-stat	0.0125	0.3068	1.3409	1.9226	2.1171	0.6101			
p-value	0.9901	0.7596	0.1828	0.0572	0.0366	0.5431			

Table 8 tells us about the impact of macroeconomic variables on herding behavior that whether this impact is significant or not. Results show thatΥ_1, the coefficient of absolute market average return $\left|R_{m,t}\right|$ has a value of 0.04 with a p-value of 0.7596,Υ_2, the coefficient of ${R^2}_{m,t}$ has a value of 1.0031 with a p-value of 0.1828.This shows overall in the Pakistani market herd is not followed in the banking sector and there are chances that market participants are deciding based on the macroeconomic fundamentals. Chang et al (2000) stated that a higher value of adj.R^2 in case of developing countries portrays that investor decision making involves more focus on available macroeconomic information due to scarce firm related information. Henceforth, macroeconomic variables' impact is checked and it was found from Table 8, after incorporating macroeconomic information in the CSAD model, that adj.R^2 value has been decreased significantly rather than increasing which shows that the new independent variables which are market specific factors are not explaining the deviation very well. EMH advocates that prices truly reflect available firm specific and market based information if and only if the markets are efficient. This is not the case here, we found that in Pakistani market though investors are not herding but they are also not relying on macroeconomic variables like interest rate, inflation and money supply. This is what we conclude from a lower adj.R^2 than normal. It confirms certain inefficiencies

in the market as this study have already discussed in the results of Table 2b , Table 4b and Table 7b. In other terms it is concluded that market participants although are not herding they also do not consider the fundamental macroeconomic information and there are certain other influences which drives the market. These influences typically can be the law and order situation or political situations in a country. It is also reported by Akhtar (2006) that one of the major factors which affect the economic performance of Pakistan ,to a grass root level, are political and macroeconomic stability because the political and macroeconomic stability accounts for creating a centre of attention for both the national and international investors.

This study is consistent with the study of Javaira & Hassan (2015) which also reported that macroeconomic fundamentals have no such significant impact on herding behavior. Other than these two studies, no study reports something more about macroeconomic fundamentals and herding behavior directly.

CHAPTER 5

CONCLUSION

The behavior of herding finds its roots back in the Keynesian era when Keynes (1936) first proposed his famous theory about employment, interest and money. In that theory he discussed the role of psychology in influencing the investment patterns of market agents long before the emergence of behavioral finance and behavioral economics. Since then a branch of study is dedicated to this line of research. Herding is a phenomenon in which investors move in a financial market in groups and crowds to get market gains and to avoid exceptional losses. This irrational and noise trading behavior is studied from many different aspects and in many different countries.

This study aims to find out this behavior in the Pakistani banking sector, as the banking sector has its own importance in Pakistan and ever since this sector has been ignored previously by researchers with respect to herd detection. Hence this study has an aim to explore this neglected sector by using daily and monthly samples of stock prices from all the commercial banks listed in the stock exchange for the period of 2009-2018.Two models CSSD and CSAD are used, proposed by Christie & Huang (1995) and Chang et al. (2000) and some modifications made to Chang et al. (2000) model by Gleason et al. (2004).All these models are estimated through the use of Ordinary Least Square (OLS) technique.

Herding behavior is measured in different market conditions like in rising and falling market situations, in high and low liquidity ,in high and low volatility levels, and in up and down market. Results show that investors are not like to herd in all these situations. Moreover, herding is also estimated in the presence of macroeconomic factors to give a holistic view of the market. It is observed from the results that the

stocks of banking sector of Pakistan are not rational, efficieint and not even fairly priced. Results depicted two different extremes, no herding behavior at one extreme and inefficiency on the other. If the market is not herding, then it must incorporate macroeconomic information in its performance and would be considered as just according to the rational asset pricing model. Interestingly results shows that Pakistani investors are though not herding but the investors even do not consider the macroeconomic factors while making decisions which render the market inefficient.

5.1 Policy Recommendations

The results of this study have important implications for the Pakistani stock market. The first and foremost implication of this study is to inculcate behavioral aspects while determining assets' prices because asset prices depend upon investors' decision making about buying and selling which by and large is a behavioral phenomenon along with financial. Moreover, investors must be very careful while making financial decisions regarding new investments, sale and purchase of securities, mergers, acquisitions, selecting capital budgeting techniques and investment evaluation. As far as international and foreign investors are concerned they must also see the behavioral aspects of this market while investing. With a better understanding of trading dynamics and ensuring better quality information dissemination, behaviors of the investors and hence the market's overall behavioral concerns can play a constructive role in the stock market.

5.2 Future research and limitations

The result findings of this study shows that the Pakistani market investors are although not herding, they are also not considering macroeconomic factors for the decisions of investments, rather there are certain other factors which are driving the

market. Future research can be done to check if the market is not considering market fundamentals and not even herding then what are these factors that might drive the market. Moreover this study is focusing on banks, future researchers can extend this research to other firms and institutes of financial sector like Mudarabah companies, Insurance companies, leasing companies etc. The researchers can also employ other models of herding used in the recent years by other countries that are not yet applied in the Pakistani Market

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