Herding Behavior in Karachi Stock Exchange

1) Tariq Javed, 2) Nousheen Zafar, 3) Bilal Hafeez, Mohammad Ali Jinnah University, Islamabad.

Key words: Herding, propagated, frailty, instability, Noise traders, cross sectional standard deviation, cross sectional absolute deviation, efficient market hypothesis, volatility

Abstract: This study aims at examining the existence of herding behavior of investors in Pakistani stock market. KSE 100 is selected as a sample for the study as it represents almost 86% of Karachi Stock Exchange. Monthly data for companies has been gathered for analysis. Results obtained fail to find any evidence of herding in Karachi stock exchange with significantly positive values for dichotomous variables representing extreme market conditions. Similarly the value for squared market returns is also found negative but insignificant. The study concludes that Herding behavior does not exist in Karachi Stock Exchange analyzing monthly returns data.

Introduction

Human beings make their decisions on the basis of different quantitative as well qualitative data collected from the surroundings. Their beliefs are developed on the basis of happenings around them. They normally do not accept the differences in the psychological perception and actual occurrence of an event. This state creates a psychological imbalance. Interrogation and observation are the frequently used measures to collect the information to support their decisions. This interrogation and observation is performed on the experts of the field regarding model or area of interest to lead the implementation of decision. The judgment must be as rational as possible to guide the evolution of scientific thought. The acceptance of opinion of experts affects the judgment of others and impacts their decision making. Everyone can follow the situation in which the experts have poorly estimated the information which results in inefficiencies and errors.

Very interesting phenomenon in the field of economics is “herding” in human, when they flock each other under some condition rather than taking their own decisions on the basis of their own beliefs. This decision is perfectly rational when the belief is that the others have better information. However the belief can be propagated by herding if all belief that a specific stock is going to increase in future and everybody tries to buy that stock which increases its demand and resulting high price in the stock market. Here the elicitation theory can play very important role to analyze the motivation and actions of herd. The need is to understand why this scientific community demonstrates herding behavior.

There are some observers who express their possible concerns about herding in the market, participants in the herding process intensify the instability, weaken the markets and enhance the frailty of the financial system (Persaud, 2000). Here a very common question arises why investors react at the same time with the same piece of information intensely? And is it the same practice in the developed and transparent markets or there are other influential factors. Under the efficient market hypothesis where the prices are assumed to reflect all the possible information momentum investment strategy is not considered as a rational. This form of strategy is when the investors buy and sell stock on the basis of their past returns. They buy the recent winners and sell the recent losers. This is also called as a “positive feedback” strategy which may create high volatility (Bikhchandani and Sharma, 2001). They also pointed out the reasons for herding behavior of utility maximizing investors, others may know the return on investment and they expose this information through their actions. This may be true for the money managers who invest only on the behalf of others or investors may have an intrinsic preference for conformity.

When the investors have difference of opinion and are diverse in their beliefs it becomes very difficult and important for a market to collect these beliefs and determine the equilibrium (Belhoula and Naoui,
2011). To create a simplified picture of actual market activity, scholars assume an interaction between traders: who buy stock that are undervalued and sell them when they are overvalued, here the threshold is fundamental value they are called “Smart money” versus “Noise traders” who perform their trading activity on noise rather than market information (De Long, Shleifer, Summers and Waldman, 1990). “Informed” versus “Uninformed” (O’Hara, 1995). “Chartists” versus “Fundamentalists” former are those who buy stock on the basis of historical data and subsequent are those whose trading is based on macroeconomic and other indicators (Hirshleifer, 2001).

To measure the herding behavior CSSD and CSAD are used like many other researchers. The values of CSSD and CSAD are also regressed by swapping the independent variables of CSSD and CSAD. It is hypothesized that if the values of β1 and β2 are negative there will be a herding behavior of investors in the market. The negative values of coefficients will reduce the values of CSSD and CSAD.

The first part is comprises on the introductory text regarding herding behavior of investors in Pakistani stock market. Second part gives insight in the existing literature and their results. Third part is comprises on the data collection and methodology followed in the paper. The fourth part is of data analysis interpretations and conclusion.

Literature Review

The term herding pertains to the animal’s behavior, flocks, schools and human conduct during stock market crashes. Herding behavior describes how individuals proceed collectively without proper planning. It manifest itself when the investors make decision (buy or sell stocks) without having information in the support of their actions. This may creates imbalance and high volatility in the stock market. It has been proposed by Borensztein and Gaston (2003) that when the stock if frequently traded and primarily flows in specific direction, the direction with fewer trades might have the greater dollar amount. Researchers like Wermers (1999), Borensztein and Gaston (2003) extended the paradigm of herding research by measuring overbought – oversold behavior by institutional investors, along with the study of Nofsinger and Sias (1999).

There are certain traders who do not react logically to any new set of information (Belhoula and Naoui, 2011). Researches in the field of behavioral finance set psychological biases underlying the behavioral explanations of the observed security price behavior (Tverky and Kahneman 1974, 1979), Hirshleifer (2001), Barberis and Thaler (2002), Szyszka (2008). Investors are expected to make biased decision under uncertainty because of limited resource which leads them to apply heuristics (Hirshleifer (2001) or show the same behavior when the trade on the same signals or follow the other group of investors. In this heterogeneous setting, it is expected that the traders would normally differ in their trading patterns and demonstrate divergence due to their behavioral biasness, but two very important patterns of investor behavior like herding and positive feedback trading may rather show a convergence and reveals potential for common ground in their symptom (Belhoula and Naoui, 2011). They defined herding behavior in stock market as behavioral inclination of an investor to eliminate their own set of information and follow the actions of other investors. According to Bikhchandani and Sharma (2000) herding behavior is the intention of investors to replicate the behavior of other investors. Chang, Cheng and Khorana (2000) argued that herding can provoke a mispricing of securities because of biased opinion / expectation of expected risk and return and it will cause a trouble for rational decision making.

According to the Demirer and Kutan (2006), herding behavior of investors explains an alternative way of investment choices of investors in the market. Researcher in the field of herding believe that existence of herding may have implications for assets pricing models, since it has behavioral effect on stock price movement and correspondingly has an impact on the risk and return of the stock (Tan et al., 2008). If market participants follow trends, the volatility of returns might be aggravated and therefore the financial systems might be destabilizing (Hadiwibowo, 2010) specifically during a crisis period (Demirer and Kutan, 2006). Investors are considered to be following herds when
they change their investment decision on the basis of other investors’ actions (Ferruz and Vergas, 2007). In the asset pricing context, herding may cause stock prices to deviate from their fundamental values. As a result investors are forced to trade at inefficient prices (Raja and Selvam, 2011). The existence of herding may have an impact on the risk and return characteristics of securities and has implications for asset pricing model (Tan et al. 2008). This phenomenon may also be observed in the Pakistani stock market.

There is huge theoretical support behind rational and irrational herding behavior of investors. Investors make their decision by getting supporting information from observing the others’ transactions and end up in informational cascade (Banerjee, 1992; Bikhchandani, Hirshleifer, and Welch, 1992; and Welch, 1992). According to Hirshleifer, Subrahmanyam, and Titman (1994) basic reason behind the herding behavior is that the investors use the same source of information. Scharfstein and Stein (1990) attributes advance reputation costs arising out of acting differently from others as a cause of herding.

Another attribute of herding behavior pointed out by Falkenstein (1996); Del Guercio (1996); Gompers and Metrick (2001) is the coincidence that they are attracted to similar securities with similar attributes like historical returns, size and liquidity. Another important element in the support of herding is the fashion (Barberis and Shleifer, 2003). Herding has mixed evidences in the market. Pension fund stocks have no evidence of herding (Lakonishok, Shleifer, and Vishny, 1992), Wermers (1999) finds week evidence of herding in pension fund stocks. Pirinsky (2002) and Sias (2003) find significant level of herding in an average stock by institutional investors.

Herding normally emerges in the period of huge price movement or market stress. Institutional investors have a major impact on the price movement, it will be surprising to see that the institutional investors also herd, they are considered to be the most sophisticated and well equipped with their personal information as compared to the individuals. Christie and Huang (1995) argue that investors are more likely to suppress their private beliefs in favor of consensus during periods of unusual market movement. According to the Bikhchandani and Sharma (2000) investors cannot observe the chance in their portfolio on the basis of individual stock to replicate the behavior. However these changes can be observed at industry level. This is an interesting phenomenon to determine whether institutional investors herd on buying side or selling side.

**Models of Herding**

The first model is based on the useful information collected by the agent by observing the actions of other agents. They completely ignore their own private information. In this situation the agent is in the informational cascade. This model is called information-Based Herding and Cascade (Sharma, 2004). Better public information or shifts in the underlying value of action could result in dissolution of cascade.

The second model is based on the notion that the investors decide to follow the same source to information of same stocks. This model was proposed by Froot, Scharfstein and Stein (1992). They focus on the short-term horizon of investors which directs towards positive informational spillovers. This model is concerned with those investors who follow the same source of information being used by other investors. Hirshleifer, Subrahmanyam, and Titman (1994) considered early informed investors and late informed investors, the early inform investors have an aggressive behavior in the initial behavior and invalidate their opinion in the next period to reduce long-term risk. The late informed investors cause the price to reflect early informed investor's information. This model is called Information Acquisition Herding.

The third model is developed by Scharfstein and Stein (1990) termed as Principal-Agent Model of Herding. This model is activated when principals are doubtful regarding their agent’s ability to pick the right stock; agents mimic the decision of other agent to defend the principals’ uncertainty about his ability.

In the fourth model the investors share preference towards stocks with certain characteristics like risk, liquidity, size, and returns (Falkenstein, 1996; Del Guercio, 1996; Gompers and Metrick, 2001). They
follow each other in recognition to their similar preferences. According to the Dreman (1979) and Friedman (1984) herding may be a result of fads. This practice attracts funds towards relatively higher return stocks and moves the prices away from their fundamental values (Barberis and Shleifer (2003). Chang, Cheng and Khorana (2000) argue that herding behavior of investors affect stock price fluctuation, it will misprice the security because investors follow the biased opinions to get higher returns at minimum risk by following trend rather than using their own private information. Gleason, Mathur and Peterson (2003) rejected the presence of herding in American stock market during extreme market fluctuations. When the investors follow the trend of each other it increases the kurtosis excess stock returns distribution increases. Stocks may also be traded on the basis of their historical price that is called positive feedback trading, investors buy stocks when market is improving and sell stocks when market is declining. They are called as positive feedback traders. Positive feedback trading can be associated with some behavioral bias that affect investor decision such as representativeness heuristic Biais, Hilton, Mazurier and Pouget (2000), conservatism bias (Hirshleifer (2001)) and overconfidence (Odean 1998).

According to the recent developments in the measurement of herding major focus is on how to differentiate the replicated herding from information driven herding. Different researchers like Zitzewitz (2001), Bernhard et al. (2006), Chen and Jiang (2006), and Jegadeesh and Kim (2007) investigated the herding especially through quantitative methods to explain the information effect. Jegadeesh and Kim (2007) developed a simple model to examine whether any herding is driven by the need of imitation. Most of the previous studies explained herding with respect to the characteristics of the analyst. According to the Graham (1999) herding is more likely in newsletters with low abilities or high reputation. Hong et al. (2000) argue that herding relates to the characteristics of analysts such as experience and accuracy level in their previous forecasting. Their study was extended by Clement and Tse (2005) they incorporated additional characteristics of the analysts, their result indicated that the previous accuracy, experience and brokerage increases boldness but move negatively with number of industries analysts follows. Unique stock characteristics may promote the herding behavior among the analysts. Jegadeesh et al. (2004) argue that the normally analysts gave high value to those stocks which have positive momentum, higher growth and volume which also contribute in making the stocks expensive.

It can be argued that herding is an irrational behavior which is strengthens by low information. According to Banerjee (1992) herding is ‘everyone doing what everyone else is doing, even when their information suggests doing something different’. According to the Prechter and Parker (2007) herding may be because of uncertainty about valuation. Kultti and Miettinen (2006) proposed that if the information cost about predecessors’ actions is very expensive comparative to all the agents they will act in accordance to their own signals. If observation is free on acts in herding behavior. The investors who have financial crises may not have sufficient time to collect and analyze information from raw data; hence investors may go for herding during financial panic. Christie and Huang (1995) used daily and monthly returns for NYSE and Amex firms and found no herding. Chang, Chen and Khorana (2000) found herding in South Korea and Taiwan markets by developing a non-linear model and no evidence was observed in USA, Hong Kong and Japan markets. Intraday data of American Stock Exchange was analyzed by Gleason, Mathur and Peterson (2004) and found no herding among the sector ETFS. Caparrelli, D’Arcangelis and Cassuto (2004) examine Italian stock market and find a nonlinear relationship between the dispersion and returns. Henker, Henker and Mitsios (2006) find no market wide herding in Australian market.

**Hypothesis**

Herding is an irrational behavior and does not follow the traditional thinking that the people are rational, it is information dissemination, in the extreme market situation the traders do not know the value of upcoming new information they need to make decision in the short period of time then they go for herding. According to Kultti and Miettinen
(2006) it is quite easy and not expensive to observe the change in market return. Investors will go for herding in this extreme market situation. In order to test the existence of herding regression would be used. Different researcher used the regression analysis like Chang et al. (2000), the coefficients of $\beta_1$ and $\beta_2$ are used to test the herding when using cross sectional standard deviation, similarly the value of $\gamma_2$ will be used to measure herding when using cross sectional absolute deviation. If herding exists in Karachi Stock Exchange the value of $\beta_1$, $\beta_2$ or $\gamma_2$ will be significantly negative and the values of CSSD and CSAD will become smaller.

$H_1$: Herding exists in the Pakistani stock market in extreme market conditions.

$H_2$: when CSAD is measure, evidence of herding is found in the Pakistan stock market.

If the value of $\beta_1$ is negative it means the investor will herd in the extreme upward market situation. If the value of $\beta_2$ is negative means investor herds during extreme downward market situation. The value must be significantly negative. However when the value of $\gamma_2$ is significantly negative it means investors herd both in the downward and upward extreme market situation.

**Methodology**

Most of the scholars used cross sectional standard deviation (CSSD) or cross sectional absolute (CSAD) deviation to measure the herding. Previous examination of market wide herding have weak signal or no existence of herding. According to Chang et al. (2000) herding measure is higher when market is declining than it is advancing. Henker et al. (2006) find partly support.

China found that turnover rate (traded volume/total shares) may influence herding, they proposed that the stocks with low turnover rate may have higher tendency to hard market. According to the Avery and Zemskey (1998) investors may not have sufficient information; they may observe and follow the other investors’ actions.

This study hypothesizes that herding exists in the period of high market volatility. If herding exists in the market the return of an individual stock converge towards the market index. Therefore there will be small difference between the return on individual stock and market return. We used two alternative measures of dispersion to observe herding behavior CSSD and CSAD. Christie and Huang (1995) proposed the method of CSSD and expressed it as:

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

Chang et al. (2000) defines the cross sectional absolute deviation as under:

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

Here $R_{i,t}$ is the return of individual stock and $R_{m,t}$ is the return of market index during the same period denoted as $t$; $N$ is the number of stock listed on stock exchange during the time period $t$. Karachi Stock Exchange (KSE) has its own values for CSSD and CSAD. KSE 100 index is used as a proxy to measure KSE equity market index. In the period of market stress herding will be more prevalent, which is defined in terms of extreme market returns. Herding will be tested through following equation:

$$CSSD_t = \alpha + \beta_1 D^U_t + \beta_2 D^L_t + \epsilon_t$$

Here:

$D^U_t$ represents the dichotomous variable at time $t$; if the return on the market lies in the extreme upper tail of the return distribution the value of $D^u$ will be equal to 1 in any given time period.

$D^L_t$ represents the dichotomous variable at time $t$; if return on the market for any give time lies in the extreme lower tail of the return distribution the value of $D^l$ will be equal to 1.

In order to define the extreme upper and lower tail the benchmark is five extreme values on both the ends. The existence of herding will be assessed as that the value of CSSD will be smaller in the period of market stress. If the value of $\beta_1$ and $\beta_2$ are statistically significantly negative these value would indicate the existence of herding. If investor is
rational, and the individual stock has different sensitivity to the market return, the value of $\beta_1$ and $\beta_2$ will be zero or will not be statistically significant. The second alternative measure of dispersion is cross-sectional absolute deviation (CSAD), Chang et al. (2000) proposed a nonlinear relationship between CSAD and market return as follows:

$$CSAD_t = \theta + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + \epsilon_t$$

If herding exists, then $\gamma_2$ will be significantly negative.

Gleason et al. (2004) argued that the values of dispersion proxies should be swapped to find out the herding behavior. The swapped equations will be as follows:

$$CSAD_t = \alpha + \beta_1 D_t^U + \beta_2 D_t^L + \epsilon_t$$
$$CSSD_t = \theta + \gamma_1 \left| R_{m,t} \right| + \gamma_2 R_{m,t}^2 + \epsilon_t$$

Data Analysis

Data has been analyzed on basis of Descriptive Statistics and Regression Analysis as under:

Descriptive statistics

The below table shows the descriptive statistics of variables, the mean value of composite index return is 1.018%, with standard deviation of 10.53 during the period of 96 sampling months. During this sampling period KSE has positive return i.e. above 0 for 62 months. The minimum and maximum values for composite return are -44.88 and 52.94 respectively. CSSD has a mean value of 15.357 with deviation of 20.19. CSSD maximum dropped to 4.25 and has a maximum rise of 197.52. Similarly CSAD has an average value of 11.04 and deviation of 16.38, the maximum value dropped to 1.27 and has a maximum rise of 155.33.

The results show that all the values of CSAD are lower than the values of CSSD. Lesser standard deviation implies that CSAD is more reliable measure for herding. Mean value for CSSD is although higher than CSAD but its standard deviation is also high which makes the series more volatile.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index %</td>
<td>1.018</td>
<td>10.53</td>
<td>-44.88</td>
<td>52.94</td>
</tr>
<tr>
<td>CSSD</td>
<td>15.35</td>
<td>20.19</td>
<td>4.25</td>
<td>197.52</td>
</tr>
<tr>
<td>CSAD</td>
<td>11.04</td>
<td>16.38</td>
<td>1.27</td>
<td>155.33</td>
</tr>
</tbody>
</table>

Regression Analysis

Regression analysis has conducted for two dependent variables CSSD and CSAD respectively.

Cross sectional Standard Deviation

Table I below shows the results for regression with CSSD as dependent variable.

<table>
<thead>
<tr>
<th>Regression Analysis for CSSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coefficient</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>$D_t^U$</td>
</tr>
<tr>
<td>$D_t^L$</td>
</tr>
<tr>
<td>$R^2$</td>
</tr>
<tr>
<td>Adj $R^2$</td>
</tr>
<tr>
<td>$F$-value</td>
</tr>
<tr>
<td>Observations</td>
</tr>
</tbody>
</table>

*Significant at 95% confidence interval

**Significant at 90% confidence interval

Table I shows the coefficient for $D_t^U$ is positive and statistically significant ($t = 6.5932$). The coefficient for $D_t^L$ is also positive and significant but at 90%
level of confidence. R square for the model implies that 32% of CSSD can be defined through these two independent variables. F value is also significant which shows the goodness of fit of the model.

These results do not exhibit any existence of herding behavior in the market since the coefficients $\beta_1$ and $\beta_2$ are significantly positive whereas for herding to exist both these variables had to be negative. The positive relationship shows that in extreme market conditions cross sectional standard deviation increases among returns. This implies that investors take their own decisions in extreme market conditions and do not follow the market trend. Thus we reject our hypothesis that herding in Pakistan exist in extreme market conditions.

Cross Sectional Absolute Deviation

Table III below shows the regression results when CSAD is used as a measure of herding.

<table>
<thead>
<tr>
<th>CSAD</th>
<th>CSSD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T-Value</strong></td>
<td><strong>Coefficient</strong></td>
</tr>
<tr>
<td>Intercept</td>
<td>8.10</td>
</tr>
<tr>
<td></td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>5.70</td>
</tr>
<tr>
<td></td>
<td>2*</td>
</tr>
<tr>
<td>$D_{U_t}$</td>
<td>43.0</td>
</tr>
<tr>
<td></td>
<td>246</td>
</tr>
<tr>
<td></td>
<td>7.09</td>
</tr>
<tr>
<td></td>
<td>05*</td>
</tr>
<tr>
<td>$D_{L_t}$</td>
<td>13.2</td>
</tr>
<tr>
<td></td>
<td>256</td>
</tr>
<tr>
<td></td>
<td>2.17</td>
</tr>
<tr>
<td></td>
<td>96*</td>
</tr>
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</tbody>
</table>

Results of regression shows that coefficient of absolute market returns (0.9805) is significantly positive ($t = 2.0911$). The relationship found between cross sectional absolute deviation and squared market return is negative but this relationship is insignificant. R square of the model is also low. Only 17% of CSAD can be explained by using these independent variables. F value of model is 9.6772 that is significant enough to explain goodness of fit of the model.

For herding to persist in market it is hypothesized that coefficient of squared returns will be significantly negative. However this condition does not hold for our data. The value of $\gamma_2$ is negative but this is not statistically significant. Although the value of $\gamma_1$ is significantly positive, no evidence of herding is found and thus we can not accept our second hypothesis.

CSSD and CSAD Swapped Equations

Gleason et al. (2004) proposed that herding behavior may also be predicted by swapping the variables of above defined models. Regression analysis made for swapped equations is given as under:

Table IV

Regression Analysis for Swapped Equations

<table>
<thead>
<tr>
<th>R Square</th>
<th>0.3651</th>
<th>0.1119</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adj. R Square</td>
<td>0.3515</td>
<td>0.0928</td>
</tr>
<tr>
<td>F- value</td>
<td>26.7445*</td>
<td>5.8570*</td>
</tr>
<tr>
<td>Observations</td>
<td>96</td>
<td>96</td>
</tr>
</tbody>
</table>

*Significant at 95% confidence interval

The swapped regressed models shows when CSAD is used as dependent variable in equation I in place of CSSD, the results do not change. Coefficients for
the dichotomous variables remain positive and significant. Similarly when CSAD as dependent variable is swapped by CSSD in equation II results do not change. $\gamma_2$ stays negative and statistically insignificant. Thus in light of these two new equations, we may conclude there exist no herding behavior in KSE.

Conclusion

We used two different measures to examine the investors’ behavior in Karachi Stock Exchange with the swapped values of independent variables. Even though there is no evidence of herding behavior in the market, but there are an interesting indications regarding investors’ behavior that investors herd in an extreme downward market situations. Even though the negative value of $\gamma_2$ is not statistically significant, but this negative value exhibits chance of existence of herding to some extent. Since behavioral biases are short term phenomenon, a more comprehensive analysis by expanding the sample size or by having daily or weekly data may provide us with some evidence of herding behavior in KSE. Investors tend to herd in the downward market situation thus the regulatory authorities should set up a monitoring system to regulate and enforce the listed companies to offer sufficient information promptly for the investors to reduce herding behavior in downward market position.

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