An Assessment of the Mimicking Tendency of Investors in an Indian Benchmark Index

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Investment decisions may be taken after a detailed fundamental and technical analysis or through mental shortcuts. Some play a smarter role by mimicking other's investment pattern on the assumption that others are better in taking investment decisions. This mimicking behavior is called herding. Many previous studies have already proved how much damage herding behavior can cause on stock markets by driving prices away from fundamentals and creating volatility. The present study focuses on market herding in Indian equity market by considering National Stock Exchange (Nifty) 50 index during the period from April 1, 2005 to March 31, 2015 by using Christie and Huang (CH) model, Chang et al. (CCK) model and HS (Hwang and Salmon) model. This is the first study in Indian scenario that takes into consideration all the three models in quarterly, yearly and whole period analysis. The study concludes that Indian stock market is generally free from herding behavior except during short periods, which could be attributed to shocks such as financial crisis and economic setbacks. The implications of these developments in the financial sector, has been the period of study, which is a decade of post-liberalization in Indian economy, and hence this study provides a good insight into the health of Indian stock market.

Key Words: *Herding Behavior, Christie and Huang (CH) Model, Chang et al. (CCK) Model, Hwang and Salmon (HS) Model and Nifty 50*

INTRODUCTION

Aim of every investor is to maximize return from the market. A rational investor will achieve this goal by taking trade decisions based on market fundamentals. But when challenged with market volatility, unpredictability and time, many investors go for mental shortcuts to take quick decisions. But such decisions mostly turn out to be

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biased and ultimate loss. So some investors, who lack confidence in taking such investment decisions, may have a tendency to mimic the investment of other investors whom they have faith in taking better decisions. This mimicking tendency is called herding behavior. Le Bon (1960), Festinger (1954) and Asch (1952) were some of the pioneers who studied herding behavior in Psychology. Herding behavior was considered as a subject of study in the field of finance in 1980's and 1990's (Banerjee, 1992; and Bikhchandani, Hirshleifer and Welch, 1992; Nofsinger and Sias, 1999; and Sias, 2004).

Investors' tendency to herd could be either intentional or unintentional. Intentional herding is defined as the investors' inclination towards imitating others actions purposefully. In intentional herding investors imitate others decisions even by ignoring their own initial assessments (Avery and Zemsky, 1998). Unintentional herding is the mimicking behavior that happens by chance. This can happen when investors take same or similar decisions independently, based on the information they receive (Froot, Scharfstein and Stein, 1992; and DeBondt, 1999). Thus by definition it is clear that unintentional herding is always rational herding whereas intentional herding could be either rational or irrational (Devenow and Welch, 1996). Intentional herding becomes rational herding when an investor mimics others in the belief that others are better informed than them. But when an investor blindly follows the crowd's investment behavior, it is irrational herding (Banerjee, 1992; Kallinterakis and Ferreira, 2007; and Bikhchandani, Hirshleifer and Welch, 1992). In irrational herding since investors herd blindly or herd on the basis of wrong information, the chance for shifting the price of a security from its fair value is high (Bikchandani and Sharma, 2001; and Asch, 1952).

Though most investors have herding tendency, they may not herd every time. Some investors herd during the bearish period because they hope herding gives them a sense of security and some in bullish period because they hope majority of the investment decisions can turn out to be good (Bartels, 1988; Kallinterakis and Ferreira, 2007). Investors could also follow the crowd when the market becomes volatile (Pucket and Yan, 2007). Some investors herd the crowd out of fear that others will treat them as outsider for not joining their trade direction. In other words they herd, since they don't want to be seen as a recluse by others (Liu, 2013). Whether herding is rational or irrational, herding results in market bubbles, which unequivocally ends up in bursting of the bubble with disastrous consequences to economies. This justifies the continuing interest in the study of herding in the markets of various nations.

LITERATURE REVIEW

Several studies have already been done to investigate the presence of herding behavior of investors with different models and during different time periods. Some of the important studies that concentrated on herding behavior are discussed here:

Herding behavior during the extreme price movements of shares was examined by employing a model hereafter referred to as Christie and Huang (CH) model (Christie

and Huang, 1995). Their model was the first one to detect herding in the market using market observables. Using daily data from New York Stock Exchange (NYSE) and monthly data from AMEX firms, study showed that there was no visible herding even during stress periods and market behavior was consistent with the prediction of rational asset pricing models and suggest that herding was not an important factor in determining equity returns during periods of market stress. CH model was later improved to detect herding in the market on any day of trading including soothing periods (Chang, Cheng and Khorana, 2000). The model, hereafter called Chang Cheng Khorana (CCK) model, examined herding behavior among investors in five different international markets namely, Hong Kong, Japan, South Korea, Taiwan and USA (Chang, Cheng and Khorana, 2000). The model was successful in finding significant herding in emerging markets of South Korea and Taiwan and partial herding in Japan. But the model found no evidence of herding behavior in USA and Hong Kong thus supporting the findings of Christie and Huang (1995). Later in 2004 herding behavior among investors in USA and South Korea was considered with a new method called Hwang and Salmon (HS) model developed by Hwang and Salmon (2004). The study produced evidences for the significant presence of herding behavior in both markets. Amirat and Bouri (2009) studied herding behavior of investors in Toronto Stock Exchange by applying CH, CCK, and HS model along with the earliest tool to find herding called LSV model (Lakonishok, Shleifer and Vishny, 1992). The study used monthly data from January 2000 to December 2006 but found no evidence of herding with CH and CCK model. However, HS and LSV model showed evidences for the strong presence of herding behavior in the market. Over the years these four models, namely CH, CCK, HS and LSV, have been used in different markets for different time periods to study herding in the market. Some of those studies are discussed here.

One of the most extensive studies on herding spread across 69 countries has been carried out by selecting altogether 35,328 stocks from these countries traded during the period January 1, 2000 to December 31, 2009 (Chen, 2013). Analysis of the data was done by using the three major models, namely, CH, CCK and the HS models. The study showed the presence of herding with the help of CCK model and HS model but CH model did not show any evidence of herding. The study also pointed out that herding behavior is more in developed markets rather than in frontier and emerging markets. But a study on the herding behavior among the traders in nine Exchange Traded Funds (ETFs) on American stock exchange using CH and CCK models during the extreme price movements, did not indicate any herding behavior among American investors (Gleason, Mathur and Peterson, 2004).

Studies on Spanish markets in Europe have found herding in both bullish and bearish markets during the period January 1, 1997 to December 31, 2003 by employing a model developed by Patterson and Sharma (2006) and Blasco, Corredor and Ferreruela (2012). Study in Athens stock exchange for the period 1995-2010, which included

several volatile phases, found evidence of herding behavior in the market (Messis and Zapranis, 2014). In addition to proving herding, the study also showed stocks that exhibit higher level of herding also showed higher volatility.

There are studies on herding behavior among investors in Asian countries also. An examination of the herding behavior in Chinese A and B class shares has reported that small privately owned companies' stocks exhibit more herding than government owned companies' stocks (Tan, Chiang, Mason and Nelling, 2008). Investors' herding behavior in A and B stock market of Shanghai and Shenzhen Stock Exchange during the period January 1, 1999 to December 31, 2008 was inspected with the help of CCK model and the findings of the study showed that though herding behavior is present in both markets, herding is more in B market than A market (Yao, Ma and He, 2014). The study also highlighted that herding is more in large stocks when compared to small stocks and stronger in growth stocks when compared to value stocks. Herding behavior during the extreme price movements in Japanese stock markets was examined and the findings of the study proved strong presence off herding behavior among Investors in Japanese stock market (Cajueiro and Tabak, 2009). In Pakistani stock market, study using CH and CCK models, did not show any herding behavior except during the liquidity crisis of 2005, meaning crisis created panic among investors which caused them to herd (Javaira and Hassan, 2015).

There are some studies on herding in Indian market using CH and CCK models and they have produced mixed results. Using daily data of National Stock Exchange of India (NSE) for the period April 1, 2006 to March 31, 2011, study by Prosad, Kapoor, and Sengupta (2012) found no evidence for herding behavior during the whole period. But the study found presence of herding in extreme market conditions with bullish period showing a higher level of herding than bearish period. Results were similar when the same models were applied on monthly data of Nifty 50 index for the period April 1, 2000 to February 29, 2012 (Garg and Jindal, 2014). Higher level of herding in bullish period is further supported by a study using CCK model (Lao and Singh, 2011). But the study also found that herding in India was less than that in Chinese markets.

More recently a study used CCK model on the sectoral indices of BSE and market index to identify the presence of herding in Indian stock market during the period April 1, 2005 to March 31, 2015. Yearly analysis showed presence of herding during the volatile period of 2011-12 and to some extent during the 2014-15 period. But when the whole period 2005 to 2015 is considered there was no herding in the market (Ganesh, Naresh and Thiyagaraja, 2016 and 2017).

The ability of HS model in identifying herding in the market is evident from the result of study on herding behavior in Indian market using HS model (Mandal, 2011). The study used daily data for the period 1997-2008 and found significant presence of herding in the market for both bull and bear markets. Result also confirms the finding

of Prosad, Kapoor, and Sengupta (2012) that there is less herding in Indian market for bearish periods than when the market is bullish. Study by Poshakwale and Mandal (2014) using HS model on daily data of Nifty 50 again confirmed the findings of Mandal (2011).

From the brief review it can be seen that past studies on herding in the market in India and elsewhere were mostly related to herding behavior during extreme price movements and comparisons between developed and developing countries. Present study therefore attempts an in-depth study on herding in Indian stock market by inspecting herding during the entire period of study made up of extreme price movements as well as the normal soothing periods. Quarterly, yearly as well as whole period analyses are conducted. This is expected to yield any presence of herding in the market, even if it exists only for a short period.

METHODOLOGY

The present study aims to examine the herding behavior in Indian stock market by taking Nifty 50 index as market data and its constituent stocks during the period April 1, 2005 to March 31, 2015 by collecting daily data from NSE website.

To examine the herding behavior in Indian stock market, CH model is used to find out the presence of herding behavior during the extreme price movements alone. Since herding could be during normal period also, other than the extreme price movements, CCK model is used to find out herding behavior during the entire period. From the brief review it is clear that the latest model HS is capable of identifying herding in the market even when other models fail. Therefore all these three models, namely CH, CCK and HS models are used in the present study to find herding behavior of investors.

CH MODEL

CH model is used for finding out the herding behavior during extreme price movements by using Cross Sectional Standard Deviation (CSSD). It measures the average proximity of individual asset return to the realized market average. CSSD is computed as follows:

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

where

N = Number of stocks;

$R_{i,t}$ = Observed stock return on firm i at time t; *and*

$R_{m,t}$ = Cross-section of average of N returns in the aggregate market portfolio at time t.

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t \quad \ldots(2)$$

where

α = Average dispersion of the sample excluding the regions covered by the two dummy variables.

D_t^L = One if the markets return on day t lies in the extreme lower tail of the distribution; and equal to zero otherwise.

D_t^U = One if the markets return on day t lies in the extreme upper tail of the distribution and equal to zero otherwise.

The dispersion of asset return from the market average is considered to be an indicative of herd movement. Since the dependence of individual asset returns on the market dependence varies, dispersion will increase with market return according to rational asset pricing models. On the contrary, due to herding, individual asset returns will not deviate too much from the market return (Christie and Huang, 1995).

This model is based on the concept that during herding, all individual stock returns approach market returns minimizing CSSD in the process. To find out the bullish and bearish period, first and third quartile of market return is computed and checked whether the return on day *t* lies below first quartile or above third quartile. If the return on that day lies below first quartile then it is treated as bearish period and if the return is above third quartile then it belongs to bullish period. If return of that day doesn't belong either to bullish or bearish periods, then it is treated as a normal or soothing period. The bearish period is denoted by D^L and bullish period by D^U. In short D^L and D^U are dummy variables. Herding during the extreme price movements is inspected by running a multiple regression by taking CSSD as a dependent variable and D^L and D^U as independent variables. But before running this regression, all the variables in the model have to be inspected whether it is stationary or not. For that both Augmented-Dickey Fuller (ADF) and Philip-Perron (PP) test has been applied. When the coefficient of D_t^L or D_t^U is negative and the *p*-value is below 0.05, it is considered to be evidence of herding at 5% level of significance. If the coefficient of D^L is negative and statistically significant, then herding is present in bearish market whereas if the coefficient of D^U is negative and statistically significant, then herding is in bullish market. If the coefficient of both D^L and D^U are positive then it means absence of herding during the extreme price movements.

CCK MODEL

Chang Cheng Khoruna (2000) uses CSAD (Cross-Sectional Absolute Deviation) to detect herd behavior in the market. CSAD is computed as follows:

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

where

N = Number of stocks;

$R_{i,t}$ = Observed stock return on firm i at time t; *and*

$R_{m,t}$ = Cross section of average of N returns in the aggregate market portfolio at time t.

CSAD value measures whether the stock returns move along with or against the market return. If the return of constituent stocks of Nifty index is deviating from the market return Nifty, value of CSAD increases and if the stock returns move with the market return, CSAD value decreases. But CSAD value does not explain whether herding is present in the market or not. Herding is determined by running a regression equation by keeping CSAD as dependent variable and absolute value of $R_{m,t}$ and squared value of market return $R^2_{m,t}$ as independent values. If herding is present in the market, the coefficient value of squared market return will be negative and significant. But before running this model, all the variables in the model have to be inspected for stationary. For that both Augmented-Dickey Fuller and Philip-Perron test are applied. The model is based on general quadratic relationship between $CSAD_t$ and $R_{m,t}$ of the form:

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

where

γ is an estimator designed to capture herding.

HS MODEL

Presence of herding behavior in the stock market is also cross checked by applying HS model. Investor's herding behavior is always towards the performance of market portfolio. Then the Capital Asset Pricing Model (CAPM) betas for individual assets will shift away from their equilibrium values and reduces the cross-sectional dispersion of betas from their equilibrium values. If there is no herding and all returns are equal to market return, all betas become one and cross sectional variance become zero.

The conventional CAPM assumes that $\beta_{i,m,t}$ does not change over time. But betas are in fact not constant (Harvey, 1989; Ferson and Harvey, 1991, 1993 and Ferson and Korrajczyk, 1995) and their variations are linked to herding. The model assumes that the equilibrium beta (let $\beta_{i,m,t}$) and its behaviorally biased equivalent ($\beta^b_{i,m,t}$) are related by equation given below:

$$\frac{E^b_t(r_{it})}{E_t(r_{mt})} = \beta^b_{imt} = \beta_{imt} - h_{mt}(\beta_{imt} - 1) \quad \ldots(5)$$

where

$E_t^b(r_{it})$ = Behaviorally biased conditional expectation of excess return of security i on period t;

$E_t(r_{mt})$ = Conditional expectation on the excess returns of market at time t; *and*

$h_{m,t}$ = Time variant herding parameter. ($h_{m,t}$ $d \leq 1$).

When $h_{m,t} = 0$, $\beta^b_{i,m,t} = \beta_{i,m,t}$, there is no herding. When $h_{m,t} = 1$, then there is perfect herding. If h_{mt} value is between greater than zero, it indicates presence of herding in the market. The excess return of security i on period t is calculated by the difference of stock return on day t over the risk free rate of interest on day t. The risk free rate of interest considered is Mumbai Inter Bank Offer Rate (MIBOR). Excess of market rate is considered as the difference of market return on day t over the risk free rate of interest on day t. Once the beta and biased beta are calculated, then the unknown value is $h_{m,t}$ which is calculated through cross multiplication from Equation (5) which is given below as a new equation.

$$h_{m,t} = \frac{(\beta_{i,m,t} - \beta^b_{i,m,t})}{(\beta_{i,m,t} - 1)} \qquad \ldots(6)$$

In the HS model, herding in the market is determined by the value of h_{mt}. If there is no herding, $h_{m,t}$ takes a value zero or negative. If h_{mt} value is greater than zero it indicates herding. Even though Equation (6) gives $h_{m,t}$, for each stock i, the level of herding in the market is evaluated by using all the stocks considered for the study in order to remove the effects of idiosyncratic movements in any $\beta^b_{i,m,t}$ for stock i (Hwang and Salmon, 2004). In the present study $h_{m,t}$ is evaluated by considering all the 50 stocks listed in Nifty 50 for the period of study.

For quarterly analysis $h_{m,t}$ of each stock in each of the 40 quarters are determined. Average value of $h_{m,t}$ for all the stocks in each quarter is then taken as the herding measure in the corresponding quarter. If average $h_{m,t}$ in a quarter is above zero, it is indicative of herding in that quarter. If so, t-statistics is applied to check whether the herding for the quarter is significant. To find out year wise herding, average $h_{m,t}$ of the stocks in the respective years are found. If the $h_{m,t}$ is above zero it is indicative of herding in the market for the financial year and its significance is determined by t-statistics. To determine the herding in the market for the whole period, average of h_{mt} values for each quarter is computed. If the $h_{m,t}$ value during the whole period is above zero, it indicates herding in the market. To examine whether this herding in the market for the whole period is significant, t-statistics is applied. If no sample series is available, a herding measure of 0.025 is more taken as significant herding at 5% level (Feng and Seasholes, 2002).

HYPOTHESIS

The study assumes following hypothesis:

H_{01} : *There is no presence of unit root in any of the variable.*

H_{02} : *There is no visible herding in the market.*

Table 1: Unit Root Test Statistics

S. No.	Year	ADF-t-statistics			PP test-t-statistics		
		CSSD	D^L	D^U	CSSD	D^L	D^U
1.	2005-06	–14.530**	–14.245**	–16.033**	–14.600**	–14.250**	–16.264**
2.	2006-07	–6.855**	–13.626**	–14.864**	–12.846**	–14.046**	–14.848**
3.	2007-08	–14.842**	–15.209**	–14.736**	–15.605**	–15.533**	–14.700**
4.	2008-09	–6.123**	–14.950**	–15.620**	–14.417**	–15.001**	–15.620**
5.	2009-10	–5.968**	–15.631**	–12.806**	–12.391**	–15.631**	–12.664**
6.	2010-11	–14.773**	–15.254**	–16.075**	–14.866**	–15.486**	–16.076**
7.	2011-12	–14.001**	–13.927**	–16.743**	–14.449**	–13.916**	–16.751**
8.	2012-13	–13.011**	–15.854**	–16.029**	–13.384**	–15.854**	–16.165**
9.	2013-14	–12.952**	–15.707**	–14.736**	–12.953**	–15.707**	–14.738**
10.	2014-15	–14.719**	–14.307**	–12.794**	–14.919**	–14.291**	–12.552**
	Whole Period (2005-15)	–10.416**	–31.836**	–48.259**	–57.151**	–49.833**	–48.656**

Note: **:1% level of significance; *:5% level of significance.

Source: Computed Data by Authors'

RESULTS AND DISCUSSION

RESULTS OF CH MODEL

The stationarity of the variables used in CH model is inspected by using both Augmented-Dickey Fuller (ADF) and Philip-Perron (PP) test. Output of unit root test is shown in Table 1 given in annexure which explains that all the variables for each financial year as well as for the whole period are stationary at level with the *p*-value for all of the variables being less than 0.05. Hence they are applied in the CH model.

Table 2 shows the result of CH analysis during the bullish and bearish periods in each financial year and for the whole period.

Evidence of herding at 5% level of significance is indicated by a negative value for the coefficient of D^L or D^U with *p*-value below 0.05. Accordingly it can be seen from tTable 2 that there was no herding behavior during the extreme price movements in the whole period considered for the study. Results show that herding behavior is not observed in the market for any of the 10 financial years and for the whole period beginning April 1, 2005 to March 31, 2015 because neither the coefficient of D^L nor

Table 2: Presence of Herding Behavior During Bullish and Bearish Period during each Financial Year and for the Whole Period

S. No.	Year	Coefficient of D^L	Herding or Not	*p*-value	Coefficient of D^L	Herding or Not	*p*-value	R^2
1.	2005-06	0.000	NH	0.315	0.001	NH	0.010	0.026
2.	2006-07	0.006	NH	0.012	0.004	NH	0.032	0.033
3.	2007-08	0.005	NH	0.349	0.004	NH	0.156	0.009
4.	2008-09	0.006	NH	0.000	0.006	NH	0.012	0.086
5.	2009-10	0.005	NH	0.021	0.007	NH	0.002	0.048
6.	2010-11	0.001	NH	0.539	0.005	NH	0.952	0.002
7.	2011-12	0.003	NH	0.001	0.001	NH	0.140	0.046
8.	2012-13	0.000	NH	0.011	0.000	NH	0.067	0.030
9.	2013-14	0.004	NH	0.020	0.004	NH	0.067	0.020
10.	2014-15	0.001	NH	0.109	0.002	NH	0.009	0.030
	Whole Period (2005-15)	0.004	NH	0.000	0.004	NH	0.000	0.034

Note: NH: No Herding; NS: Herding but not Significant; H: Herding.

Source: Computed Data by Authors'

Table 3: Quarterly Analysis of the Presence of Herding Behavior with CH Model

Quarter Period		Coefficient of D^L	Herding/ Not	*p*-value	Coefficient of D^L	Herding/ Not	*p*-value	R^2
From	To							
01-Apr-05	30-Jun-05	0.001	NH	0.272	0.002	NH	0.040	0.070
01-Jul-05	30-Sep-05	0.000	NH	0.902	0.004	NH	0.230	0.025
01-Oct-05	31-Dec-05	0.003	NH	0.003	0.002	NH	0.036	0.156
01-Jan-06	31-Mar-06	0.001	NH	0.520	0.002	NH	0.052	0.063
01-Apr-06	30-Jun-06	0.004	NH	0.025	0.004	NH	0.011	0.132
01-Jul-06	30-Sep-06	0.001	NH	0.187	0.002	NH	0.118	0.050
01-Oct-06	31-Dec-06	–0.003	NS	0.443	–0.002	NS	0.600	0.011
01-Jan-07	31-Mar-07	0.004	NH	0.055	0.003	NH	0.151	0.074
01-Apr-07	30-Jun-07	–0.006	NS	0.427	–0.006	NS	0.470	0.015
01-Jul-07	30-Sep-07	0.002	NH	0.219	0.002	NH	0.106	0.074
01-Oct-07	31-Dec-07	0.004	NH	0.031	0.005	NH	0.004	0.115
01-Jan-08	31-Mar-08	0.005	NH	0.304	0.010	NH	0.068	0.058

Table 3 (Cont.)

Quarter Period		Coefficient of D^L	Herding/ Not	*p*-value	Coefficient of D^L	Herding/ Not	*p*-value	R^2
From	To							
01-Apr-08	30-Jun-08	0.003	NH	0.018	0.003	NH	0.013	0.141
01-Jul-08	30-Sep-08	0.006	NH	0.003	0.007	NH	0.000	0.232
01-Oct-08	31-Dec-08	0.011	NH	0.001	0.007	NH	0.034	0.188
01-Jan-09	31-Mar-09	0.021	NH	0.012	0.002	NH	0.819	0.114
01-Apr-09	30-Jun-09	0.002	NH	0.000	0.001	NH	0.000	0.019
01-Jul-09	30-Sep-09	0.002	NH	0.000	0.001	NH	0.000	0.019
01-Oct-09	31-Dec-09	0.002	NH	0.235	0.001	NH	0.586	0.025
01-Jan-10	31-Mar-10	0.000	NH	0.773	0.002	NH	0.214	0.027
01-Apr-10	30-Jun-10	0.001	NH	0.595	0.002	NH	0.267	0.021
01-Jul-10	30-Sep-10	–0.003	NS	0.426	–0.003	NS	0.398	0.016
01-Oct-10	31-Dec-10	0.002	NH	0.207	0.001	NH	0.349	0.031
01-Jan-11	31-Mar-11	0.002	NH	0.130	–0.001	NS	0.260	0.086
01-Apr-11	30-Jun-11	0.002	NH	0.107	0.000	NH	0.807	0.045
01-Jul-11	30-Sep-11	0.001	NH	0.282	0.000	NH	0.978	0.021
01-Oct-11	31-Dec-11	0.003	NH	0.008	0.003	NH	0.015	0.154
01-Jan-12	31-Mar-12	0.002	NH	0.214	0.000	NH	0.998	0.028
01-Apr-12	30-Jun-12	0.002	NH	0.028	0.001	NH	0.296	0.080
01-Jul-12	30-Sep-12	0.001	NH	0.412	0.003	NH	0.029	0.077
01-Oct-12	31-Dec-12	0.001	NH	0.474	0.000	NH	0.542	0.012
01-Jan-13	31-Mar-13	0.002	NH	0.128	–0.001	NS	0.469	0.067
01-Apr-13	30-Jun-13	0.002	NH	0.136	0.000	NH	0.911	0.044
01-Jul-13	30-Sep-13	0.001	NH	0.732	–0.001	NS	0.830	0.005
01-Oct-13	31-Dec-13	0.002	NH	0.149	0.003	NH	0.016	0.100
01-Jan-14	31-Mar-14	0.001	NH	0.314	0.002	NH	0.106	0.047
01-Apr-14	30-Jun-14	–0.001	NS	0.734	0.006	NH	0.006	0.149
01-Jul-14	30-Sep-14	0.003	NH	0.031	0.001	NH	0.626	0.076
01-Oct-14	31-Dec-14	0.002	NH	0.146	0.000	NH	0.951	0.045
01-Jan-15	31-Mar-15	0.001	NH	0.708	0.000	NH	0.751	0.003

Note: NH: No Herding; NS: Herding but not Significant; H: Herding.

Source: Computed Data by Authors'

D^U had a significant negative coefficient value. If the herding behavior present in the market is confined only for a short period, then presence of herding behavior may not be reflected in year wise output or in the whole period. Hence this model is applied in

quarterly analysis to examine the herding behavior during the short period. Output of quarterly analysis is given in Table 3.

Table 3 shows that most of the quarters during the period of study were free from herding behavior with some exceptions in few quarters. But then the observed herding behavior was not significant at 5% level as the respective *p*-values were above 0.05. Therefore it may be concluded that as per CH model, there was generally no visible herding during the bullish and bearish phases throughout the study period.

RESULTS OF CCK MODEL

As CH model captures the herding behavior of investors only during the bullish and bearish period, CCK model is also applied to find out the presence of herding by including the soothing period also. CCK model uses CSAD to detect herd behavior in the market. Table 4 gives the descriptive measure of CSAD for each year of the period of study and for the whole period 2005-2015.

Table 4: Descriptive Statistics of CSAD

Year	Maximum	Minimum	Average	Standard Deviation	Median	Skewness	Kurtosis
2005-06	0.030	0.006	0.012	0.003	0.012	1.558	5.794
2006-07	0.031	0.005	0.014	0.004	0.013	1.225	1.927
2007-08	0.045	0.007	0.017	0.006	0.015	1.502	3.441
2008-09	0.064	0.009	0.021	0.007	0.020	1.785	5.641
2009-10	0.055	0.006	0.016	0.006	0.014	2.293	9.582
2010-11	0.024	0.005	0.012	0.003	0.011	1.159	2.697
2011-12	0.022	0.005	0.013	0.003	0.013	0.364	0.107
2012-13	0.026	0.004	0.011	0.003	0.011	1.210	4.247
2013-14	0.028	0.004	0.013	0.004	0.013	0.845	1.168
2014-15	0.047	0.004	0.013	0.004	0.013	3.275	23.613
Whole Period (2005-15)	0.064	0.004	0.014	0.005	0.013	2.331	10.227

Source: Computed Data by Authors'

The descriptive statistics of CSAD will only explain whether stock returns move along with or against the market return. If the return of constituent stocks of Nifty 50 index is deviating from the market return Nifty, value of CSAD increases and if the stock returns move with the market return, CSAD value decreases. But this CSAD will not explain whether there is herding in the market. Herding is assumed to be due to the presence of a nonlinear market. So in the absence of herding, the relationship is linear and increasing, i.e., the dispersion increases proportionately with the increasing return of the market (Economou, Kostakis, and Philippas, 2010). Before checking the

Table 5: Unit Root Test of Variables by Using ADF and PP Test

S. No.	Year	ADF-t-statistics			PP Test-t-statistics		
		$\lvert R_{mt} \rvert$	R^2_{mt}	CSAD	$\lvert R_{mt} \rvert$	R^2_{mt}	CSAD
1.	2005-06	–4.778**	–17.208**	–9.834**	–12.172**	–17.182**	–16.592**
2.	2006-07	–4.143**	–4.817**	–5.042**	–8.305**	–11.117**	–11.641**
3.	2007-08	–4.519**	–4.547**	–4.699**	–9.702**	–14.185**	–13.303**
4.	2008-09	–4.067**	–3.492**	–3.706**	–7.520**	–15.893**	–15.783**
5.	2009-10	–4.942**	–14.188**	–15.504**	–6.110**	–14.380**	–15.504**
6.	2010-11	–7.235**	–15.326**	–15.595**	–10.707**	–15.570**	–15.879**
7.	2011-12	–9.674**	–16.293**	–16.497**	–10.430**	–16.300**	–16.484**
8.	2012-13	–10.149**	–16.535**	–16.579**	–10.431**	–16.535**	–16.586**
9.	2013-14	–3.637**	–16.226**	–16.500**	–9.969**	–16.262**	–16.081**
10.	2014-15	–10.222**	–17.782**	–16.275**	–11.128**	–17.727**	–16.261**
	Whole Period (2005-15)	–5.909**	–7.513**	–9.209**	–34.478**	–62.619**	–57.477**

Note: **:1% level of significance; *:5%% level of significance.

Source: Computed Data by Authors'

presence of herding in the market, the presence of unit root for CSAD, $\lvert R_{mt} \rvert$ and R^2_{mt} are checked by using ADF test and PP test to all the variables. Output of unit root test for the variables used in the model in each financial year and during the whole period is shown in Table 5.

Table 6: Regression Output With CCK Model

S. No.	Year	Coefficient of R^2_{mt}	*p*-value	Herding/Not	R^2
1.	2005-06	0.883	0.750	NH	0.042
2.	2006-07	2.472	0.005	NH	0.419
3.	2007-08	1.752	0.045	NH	0.321
4.	2008-09	0.544	0.339	NH	0.374
5.	2009-10	–0.105	0.766	NS	0.22
6.	2010-11	4.407	0.064	NH	0.123
7.	2011-12	0.191	0.933	NH	0.140
8.	2012-13	3.771	0.345	NH	0.122
9.	2013-14	2.983	0.210	NH	0.158
10.	2014-15	–0.952	0.854	NS	0.041
	Whole Period (2005-15)	0.319	0.078	NH	0.319

Note: NH: No Herding; NS: Herding but not significant; H: Herding.

Source: Computed Data by Authors'

As *p*-values for all the variables considered for the study were below 0.05 for both ADF and PP test, there is no unit root for any of the variables in any of the financial year and during the whole period. Hence it is concluded that all the variables are stationary at level.

Regression analysis is carried out by taking CSAD as dependent variable and absolute value of market return and squared value of market return as independent variables. Table 6 shows the regression output for each year and for the whole period.

If the coefficient of the square of market return is negative and significant with *p* value less than 0.05, it is taken as evidence of significant herding. Table 6 shows market was generally free from herding except in the year 2009-10 and 2014-15. Though in the year 2009-10 and 2014-15 showed signs of herding, it was not significant at 5% level as *p*-value was above 0.05. Low level of herding may be because herding during

Table 7: Quarterly Analysis of CCK Model

Quarter		Coefficient of R^2_{mt}	P-value	Herding/Not	R^2
From	To				
01-Apr-05	30-Jun-05	–7.849	0.432	NS	0.010
01-Jul-05	30-Sep-05	0.663	0.930	NH	0.001
01-Oct-05	31-Dec-05	4.554	0.754	NH	0.012
01-Jan-06	31-Mar-06	20.407	0.222	NH	0.088
01-Apr-06	30-Jun-06	–0.360	0.873	NS	0.316
01-Jul-06	30-Sep-06	–5.017	0.554	NS	0.024
01-Oct-06	31-Dec-06	24.013	0.017	NH	0.136
01-Jan-07	31-Mar-07	8.484	0.306	NH	0.036
01-Apr-07	30-Jun-07	3.902	0.447	NH	0.040
01-Jul-07	30-Sep-07	–6.304	0.103	NS	0.058
01-Oct-07	31-Dec-07	6.216	0.151	NH	0.070
01-Jan-08	31-Mar-08	2.610	0.187	NH	0.055
01-Apr-08	30-Jun-08	–5.451	0.420	NS	0.021
01-Jul-08	30-Sep-08	4.912	0.342	NH	0.238
01-Oct-08	31-Dec-08	–1.495	0.258	NS	0.152
01-Jan-09	31-Mar-09	7.087	0.124	NH	0.057
01-Apr-09	30-Jun-09	1.100	0.200	NH	0.034
01-Jul-09	30-Sep-09	2.605	0.356	NH	0.096
01-Oct-09	31-Dec-09	3.597	0.664	NH	0.020
01-Jan-10	31-Mar-10	1.209	0.896	NH	0.012
01-Apr-10	30-Jun-10	6.032	0.236	NH	0.087
01-Jul-10	30-Sep-10	6.429	0.739	NH	0.038

Table 7 (Cont.)

Quarter		Coefficient of R^2_{mt}	*p*value	Herding/Not	R^2
From	To				
01-Oct-10	31-Dec-10	6.262	0.708	NH	0.003
01-Jan-11	31-Mar-11	5.169	0.460	NH	0.032
01-Apr-11	30-Jun-11	4.917	0.598	NH	0.022
01-Jul-11	30-Sep-11	–4.914	0.292	NS	0.026
01-Oct-11	31-Dec-11	–5.145	0.5494	NS	0.027
01-Jan-12	31-Mar-12	–4.212	0.729	NS	0.043
01-Apr-12	30-Jun-12	–16.223	0.096	NS	0.086
01-Jul-12	30-Sep-12	–10.189	0.651	NS	0.021
01-Oct-12	31-Dec-12	6.652	0.796	NH	0.023
01-Jan-13	31-Mar-13	13.738	0.591	NH	0.107
01-Apr-13	30-Jun-13	1.743	0.861	NH	0.064
01-Jul-13	30-Sep-13	1.232	0.888	NH	0.081
01-Oct-13	31-Dec-13	–47.178	0.047	H	0.071
01-Jan-14	31-Mar-14	17.049	0.489	NH	0.094
01-Apr-14	30-Jun-14	–7.577	0.668	NS	0.047
01-Jul-14	30-Sep-14	34.855	0.179	NH	0.082
01-Oct-14	31-Dec-14	–7.893	0.765	NS	0.057
01-Jan-15	31-Mar-15	–4.026	0.776	NS	0.023
Note: NH: No Herding; NS: Herding, but not significant; H: Herding.					
Source: Computed Data by Authors'					

these years might have existed only for a short duration. So to inspect the presence of herding behavior for short periods, quarterly analysis is also carried out. Higher R^2 denotes the existence of higher systematic risk in the market. Output of quarterly analysis to inspect herding with the CCK model is shown in Table 7.

Output shows negative values of R^2_{mt} for several quarters, but significant herding behavior is observed only for the quarter period October 1, 2013 to December 31, 2013. During this period, global stock markets were dropping with China witnessing the biggest crash since the global financial crisis in 2007. This affected the whole Asian markets and the after effect of this was the fall of Indian Rupee and lowering of the credit rating by Moody. These factors seem to have triggered herding for the period.

Herding in a year does not necessarily mean that there should be herding in at least one of the constituent quarters. The reverse is also true. That is herding observed in a quarter need not necessarily show herding for the financial year which includes that quarter. This result could be explained from the way the CCK model determines herding. The model uses the data defined in a time interval to evaluate the coefficient

of R^2_{mt} by regression analysis which in CCK model is basically fitting a curve. This means for different time intervals and consequently different data, the curves generated, the values of the coefficient differ, and hence conclusions could be different.

RESULTS OF HS MODEL

The previous two models showed there was no market wide herding either in any particular financial year or during the whole period. But the quarterly analysis with the help of CCK model showed herding in the third quarter of 2013-14. In the HS model, herding measure h_{mt} for each of the stocks in Nifty 50 is determined for the period of interest. Mean of these values is then taken as the herding in the market $<h_{mt}>$ for the period. Values of $h_{m,t}$ are evaluated for all the 50 stocks listed in Nifty 50 for various periods of interest. Table-8 gives summary of the result of analysis with the HS model for each year and for the whole period.

Table 8: Result of HS Model for Each Year and During the Whole Period

Year	Herding in the Market $<h_{m,t}>$	*t*-statistics	*p*-value	Number of Stocks Influenced by the Herding Behavior	Number of Stocks Free from Herding Behavior
2005-06	0.008	0.292	0.771	24	26
2006-07	0.126	4.905	0.000	39	11
2007-08	0.022	0.741	0.46	23	27
2008-09	–0.177	–	–	10	40
2009-10	–0.098	–	–	11	39
2010-11	–0.106	–	–	13	37
2011-12	–0.183	–	–	8	42
2012-13	–0.223	–	–	6	44
2013-14	–0.162	–	–	13	37
2014-15	–0.082	–	–	17	33
Whole Period	–0.087	–	–	8	42

Source: Computed Data by Authors'

Herding in the market $<h_{mt}>$for the whole period gave a value of –0.087 which means there was no herding in the market during the period. Stock-wise examination for the whole period of study showed herding with positive value of $h_{m,t}$ for only eight stocks. Table 9 shows the name of these stocks, their $h_{m,t}$ values and their *t*-statistics and *p*-value.

It can be seen that the herding observed in these stocks were not significant at 5% level. Table-8 also shows the measure of herding in the market $<h_{mt}>$ for each year determined from h_{mt} values for each of the 50 stocks in Nifty 50and number of stocks which showed herding in each year as decided by the positive value of $h_{m,t}$. Result

Table 9: Stocks Which are Under the Influence of Herding During the Whole Period and Testing of its Significance

Stock	Mean $h_{m,t}$ for the whole period	t-statistics	*p*-value
Ambuja Cements Ltd.	0.020	0.333	0.741
Bharat Heavy Electricals Ltd.	0.016	0.258	0.798
Housing Development Finance Corporation Ltd.	0.010	0.148	0.883
Oil & Natural Gas Corporation Ltd.	0.045	0.669	0.508
Punjab National Bank	0.003	0.049	0.961
Reliance Industries Ltd.	0.010	0.125	0.901
Shipping Corporation of India Ltd.	0.020	0.408	0.686
Tata Communications Ltd.	0.055	1.073	0.290

Source: Computed Data by Authors'

shows herding behavior in the market to be present in the years 2005-06, 2006-07 and 2007-08 with $h_{m,t}$ values 0.008, 0.126 and 0.022 respectively. But when the level of significance was tested, result shows the herding measure to be significant only for the period 2006-07 with a *p*-value of 0.000. There was no herding in the market after the financial year 2007-08. Table 8 also shows the number of stocks influenced by the herding behavior and number of stocks free from herding behavior. Thus for the year with significant herding 2006-07, there was herding in as many as 39 stocks out of

Table 10: Stocks Which are Under the Influence of Herding During the Period 2006-07 and its Significance

Name of the Stock	H_{mit}	Significant or Not
Mahindra & Mahindra Ltd.	0.001	not significant
Housing Development Finance Corporation Ltd.	0.021	not significant
HCL Technologies Ltd.	0.023	not significant
National Aluminium Co. Ltd.	0.027	significant
Cipla Ltd.	0.032	significant
State Bank of India	0.037	significant
Infosys Ltd.	0.040	significant
Tata Steel Ltd.	0.052	significant
Shipping Corporation of India Ltd.	0.057	significant
Mahanagar Telephone Nigam Ltd.	0.069	significant
Tata Consultancy Services Ltd.	0.074	significant
HDFC Bank Ltd.	0.076	significant
Bharti Airtel Ltd.	0.083	significant
Ranbaxy Laboratories Ltd.	0.084	significant

Table 10 (Cont.)

Name of the Stock	H_{mit}	Significant or Not
Bajaj Auto Ltd	0.112	significant
Hindustan Petroleum Corporation Ltd.	0.120	significant
Indian Petrochemicals Corporation Ltd.	0.134	significant
Ambuja Cements Ltd.	0.135	significant
Tata Chemicals Ltd.	0.148	significant
Tata Tea Limited	0.160	significant
Reliance Industries Ltd.	0.164	significant
ABB India Ltd.	0.168	significant
Steel Authority of India Ltd.	0.183	significant
Bharat Heavy Electricals Ltd.	0.201	significant
Dabur India Ltd.	0.216	significant
Larsen & Toubro Ltd.	0.217	significant
Sun Pharmaceutical Industries Ltd.	0.221	significant
ACC Ltd.	0.264	significant
Dr. Reddy's Laboratories Ltd.	0.281	significant
Hindustan Unilever Ltd.	0.291	significant
Tata Communications Ltd.	0.294	significant
Zee Entertainment Enterprises Ltd.	0.329	significant
ICICI Bank Ltd.	0.330	significant
Reliance Infrastructure Ltd.	0.343	significant
I T C Ltd.	0.355	significant
Wipro Ltd.	0.383	significant
Maruti Suzuki India Ltd.	0.404	significant
Colgate Palmolive (I) Ltd	0.517	significant
Grasim Industries Ltd.	0.528	significant
Source: Computed Data by Authors'		

which 36 stocks showed significant herding and this was tested by using Feng and Seasholes (2002) model as result is tabulated in table-10.

The year 2005-06 showed herding in 24 stocks and 2007-08 in 23 stocks, though the level of herding behavior was not significant at 5% level. For the rest years and for the whole period, only 8 stocks showed herding but then none of them were significant.

If herding behavior of investors is only for short periods, it may not be visible in year wise analysis or whole period analysis. Therefore to find herding during the short period, quarter wise analysis is carried out. The result of quarter wise analysis with HS model is shown in Table 11.

Table 11: Quarterly Analysis of HS Model During the Period						
Quarter Period		Number of Stocks Influenced by the Herding Behavior in Each Quarter	Number of Stocks are Free from Herding by the Herding Behavior in Each Quarter	$h_{m,t}$	*t*-statistics	*p*-value
From	To					
01-Apr-05	30-Jun-05	18	32	–0.057		
01-Jul-05	30-Sep-05	23	27	–0.034		
01-Oct-05	31-Dec-05	24	26	0.092	2.093	0.042
01-Jan-06	31-Mar-06	24	26	0.028	0.745	0.460
01-Apr-06	30-Jun-06	20	30	–0.027		
01-Jul-06	30-Sep-06	25	25	0.106	2.111	0.040
01-Oct-06	31-Dec-06	27	23	0.117	2.380	0.021
01-Jan-07	31-Mar-07	45	5	0.307	6.076	0.000
01-Apr-07	30-Jun-07	40	10	0.245	5.778	0.000
01-Jul-07	30-Sep-07	27	23	0.108	2.211	0.032
01-Oct-07	31-Dec-07	13	37	–0.159		
01-Jan-08	31-Mar-08	16	34	–0.104		
01-Apr-08	30-Jun-08	14	36	–0.129		
01-Jul-08	30-Sep-08	11	39	–0.191		
01-Oct-08	31-Dec-08	11	39	–0.145		
01-Jan-09	31-Mar-09	5	45	–0.245		
01-Apr-09	30-Jun-09	7	43	–0.118		
01-Jul-09	30-Sep-09	10	40	–0.113		
01-Oct-09	31-Dec-09	9	41	–0.141		
01-Jan-10	31-Mar-10	18	32	–0.019		
01-Apr-10	30-Jun-10	8	42	–0.117		
01-Jul-10	30-Sep-10	17	33	–0.079		
01-Oct-10	31-Dec-10	12	38	–0.164		
01-Jan-11	31-Mar-11	15	35	–0.064		
01-Apr-11	30-Jun-11	18	32	–0.103		
01-Jul-11	30-Sep-11	12	38	–0.205		
01-Oct-11	31-Dec-11	5	45	–0.236		
01-Jan-12	31-Mar-12	7	43	–0.187		
01-Apr-12	30-Jun-12	16	34	–0.152		
01-Jul-12	30-Sep-12	6	44	–0.314		
01-Oct-12	31-Dec-12	8	42	–0.266		

Table 11 (Cont.)

Quarter Period		Number of Stocks Influenced by the Herding Behavior in Each Quarter	Number of Stocks are Free from Herding by the Herding Behavior in Each Quarter	$h_{m,t}$	*t*-statistics	*P*-value
From	To					
01-Jan-13	31-Mar-13	15	35	–0.159		
01-Apr-13	30-Jun-13	7	43	–0.189		
01-Jul-13	30-Sep-13	14	36	–0.145		
01-Oct-13	31-Dec-13	15	35	–0.131		
01-Jan-14	31-Mar-14	14	36	–0.182		
01-Apr-14	30-Jun-14	19	31	–0.105		
01-Jul-14	30-Sep-14	21	29	–0.027		
01-Oct-14	31-Dec-14	21	29	–0.054		
01-Jan-15	31-Mar-15	11	39	–0.142		

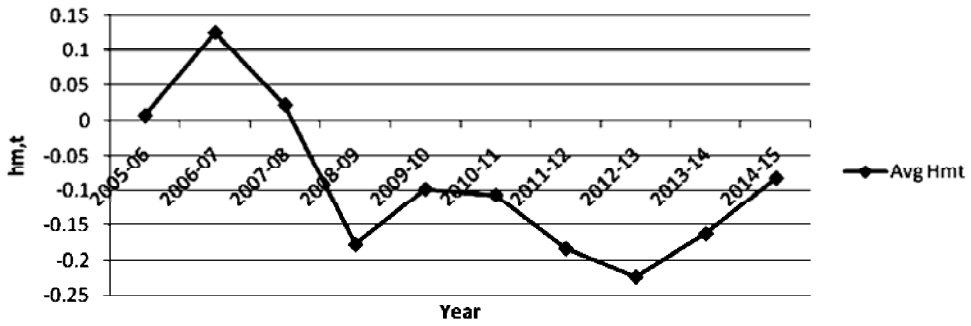
Source: Computed Data by Authors'

Table 10 shows herding during the third and fourth quarter of 2005-06 and five consecutive quarters starting from July 1, 2006 to September 30, 2007 with $h_{m,t}$ value peaking in the last quarter of 2006-07. The quarter with maximum herding also showed herding in 45 out of 50 stocks considered for the study. To inspect the significance of the level of herding, *t*-statistics was applied to the quarters with positive $h_{m,t}$ values. Result of the *t*-statistics showed that among these seven quarters, six quarters showed herding at 5% level of significance except during the 4th quarter of 2005-06. The herding behavior reflected during the five quarters ranging from July 1, 2006 to September 30, 2007 may be due to the panic among the investors mind due to the 2007-08 financial crisis.

Herding in the market was studied with three most widely used CH, CCK and HS models for finding out the herding behavior in the market. Previous studies which were carried out with more than one model produced different results for the same data. Hence all the three models were employed for a thorough study of herding in the Indian bourses. To sum up, all the three models showed that for the whole period of study there was no market herding in Indian equity market. All the three models also show that there was no significant herding for the whole period in any stock out of the total 50 stocks in Nifty 50. When shorter intervals of year and quarter periods are considered, neither CH nor CCK model showed any significant herding in any year or quarter periods and even during extreme price movements, except for the third quarter of 2013-14 (i.e., October 1, 2013 to December 31, 2013) when CCK model alone showed significant herding. In the year wise analysis HS model alone showed herding during the year 2006-07 period. In the quarterly analysis HS model

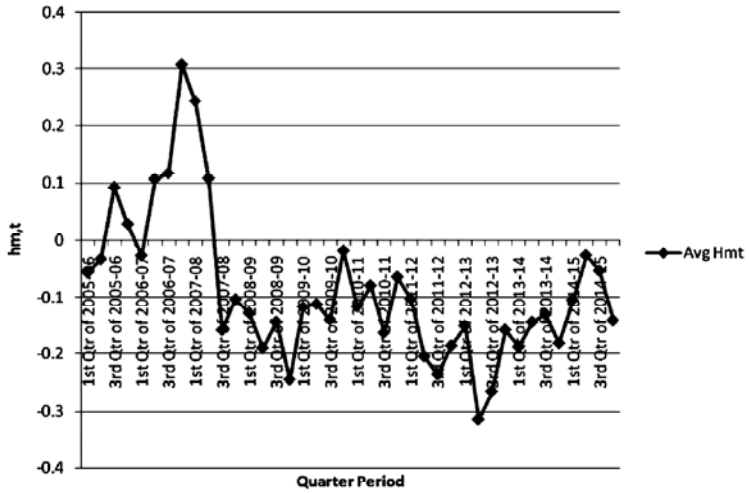
showed significant herding for five consecutive quarters starting from July 1, 2006 to September 30, 2007. In short, finding by one model is not corroborated by the other two, even though going by the number of periods where herding was found, it can be seen that the HS model seems to have captured the herding in the market with better success when compared to CH and CCK models. This is corroborated by the fact that the five consecutive quarters which showed herding correspond well with the most turbulent period in stock markets world over. The rest of the quarters in the decade of

Figure 1: Year-wise Herding Measure Trend



Source: Computed Data by Authors'

Figure 2: Quarter-wise Herding Measure Trend



Source: Computed Data by Authors'

study 2006-2015 markets were relatively quiet and HS model also did not show any herding during the period. These findings are substantiated by studies done elsewhere with multi models which show herding is better confirmed by HS model (Amirat and Bouri, 2009; Demirer and Kutan, 2010; and Chen, 2013). The studies further suggest that during the contradictions in the results, findings of HS model will be applied as it is treated as a better and latest model.

Figures 1 and 2 showed the year wise and quarter wise herding measure h_{mt} of HS model. It can be seen that the herding in the market started from July 1, 2006, grew to a maximum in the January 1, 2007 to March 31, 2007 quarter and finally subside by September 30, 2007. It can be seen that this period can be related to the global financial crisis of 2007-08 which is considered to have started from August 9, 2007 when liquidity completely evaporated causing freezing of several leading hedge funds. This means herding in Indian market started about a year before the global crisis and disappeared within a month into the one year crisis period.

Study of herd behavior in European Government Bond prices have found no herding before and after the European financial crisis; but found enough evidence of herding during the crisis (Galariotis, Krokida and Spyrou, 2015). Study in Jakarta Stock Exchange showed no herding before the 1997 Asian crisis; but during the crisis period herding behavior was found among both domestic and foreign investors (Bowe and Domuta, 2004). After the onset of the crisis, herding by foreign investors increased while herding by domestic investors decreased. As with economic crisis political turmoil is also thought to trigger herding. Study in Tunisian Stock Exchange using CH and CCK models showed no herding before and after the Tunisian revolution; though CCK model showed a weak herding after the revolution (Wyeme and Olfa, 2013). These findings support the idea that during a financial crisis, traders panic and to minimize risk they herd. But the present study in Indian market contradicts this general finding by showing herding in the market appearing before the crisis and dissipating once the crisis begins. This contradictory result is consistent with the finding of Lakshman, Basu and Vaidyanathan (2013) who also found a low level herding in Indian market before a crisis, disappearing during the crisis.

CONCLUSION

Present study is a comprehensive analysis of herding behavior of investors in Indian bourses. Study employs three well established models to find herding in the market for a period of ten years beginning April 1, 2005. The period of study covers several periods of market stress induced by major financial and political events in the country and outside. The study considers the whole period, besides sub intervals of year and quarter year. The results shows that the model of Hwang and Salmon (2004) is superior to other models in determining herding consistent with market stress periods.

The study finds significant herding in the market beginning a year ahead of the global financial crisis of 2007 and subsiding and disappearing altogether within three months into the crisis period. While studies in many markets elsewhere showed investor herding peaking during the crisis and lingering even after the crisis, the finding in Indian market is unique. Apart from the herding found preceding the global financial crisis, Indian market has been generally free of herding. This may be considered as a good sign for Indian market. Present study only looks into the overall herding behavior in Indian stock market. It will be of interest if similar methodology can be applied to find out the herding behavior in different industrial sectors.

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