Industry herding behaviour in Indian stock market

R. Ganesh*

Department of Commerce and Management Studies,
St. Mary's College,
Kuppadi P.O. Sulthan Bathery,
Wayanad 673592, India
Email: ganeshrppg@gmail.com
*Corresponding author

G. Naresh

Department of Accounting and Finance,
Charlton College of Business,
University of Massachusetts Dartmouth,
285, Old Westport Road, North Dartmouth,
MA 027472300, USA
Email: kgnaresh@gmail.com

S. Thiyagarajan

Department of International Business,
School of Management,
Pondicherry University,
Puducherry 605014, India
Email: sthiyags@yahoo.com

Abstract: Investors mimicking the investment pattern of other investors are called herding. Studies have already shown that herding is not a profitable investment strategy and could even be damaging for both investors and stock markets. Hence herding continues to be an active topic of study the world over. Understanding the herding behaviour in the market will be effective when investors have a diversified portfolio, but may not hold good when their portfolio consist of similar stocks. This emphasises the importance of studying herding in industry-wise stocks traded in Indian market. The present study employs the Christie and Huang model and Chang, Cheng and Khoruna model to trace out the presence of industry herding behaviour in Nifty 50 index during the period 1st April 2005 to 31st March 2015. The findings of the study showed that overall Indian stock market is not influenced by industry herding behaviour.

Keywords: industry herding; CH model; CCK model; CSSD; CSAD; December effect; bias.

Reference to this paper should be made as follows: Ganesh, R., Naresh, G. and Thiyagarajan, S. (2016) Industry herding behaviour in Indian stock market', *American J. Finance and Accounting*, Vol. 4, Nos. 3/4, pp.284–308.

Biographical notes: R. Ganesh is presently an Assistant Professor in the Department of Commerce and Management Studies at St. Mary's College, Sulthan Bathery, Kerala, India. He is also pursuing his PhD in Pondicherry University, India.

G. Naresh is presently a visiting scholar at Department of Accounting and Finance, Charlton College of Business, University of Massachusetts Dartmouth. Prior to that he was an Associate Professor in Birla Institute of Technology, Offshore Campus, UAE, and as an Assistant Professor in the Department of Commerce, School of Management, Pondicherry University. He has more than ten years of teaching and research experience in the field of finance.

S. Thiyagarajan is an Assistant Professor in the Department of International Business, Pondicherry University having more than 10 years of teaching and research experience in the field of quantitative techniques, econometrics and research methodology.

1 Introduction

Profitable payoff is the driving force behind any investment made by an investor. This entails an investor to undergo a detailed study about the market before taking the best investment decision. This is a challenging task, because of the complexity and unpredictability of the market and the fact that decisions have to be taken within a short span of time to exploit the opportunities before it fades away. This forces investors to rely on mental shortcuts which often end up in biased decisions. Biased decisions means taking decisions without studying the whole and taking only a partial perspective of a situation and refusal to even consider the possible merits of alternative point of view. In this circumstance the decisions taken by investors mostly end up in irrational decisions. To avoid this problem some investors will try to mimic other investors whom they believe are more intelligent or experts in the field. This mimicking tendency of investors termed as herding results in investors buying and selling same or similar stocks in large numbers over a period of time. Here the term similar stock means stocks that are classified in specific industries.

Herding behaviour can be intentional or unintentional, imitating or following the crowd's decision purposefully is known as intentional herding; whereas when herding is accidental, it is known as unintentional herding. Unintentional herding results when investors take same or similar decisions independently, based on the information they receive (Froot et al., 1992) and thus unintentional herding is always rational herding. But intentional herding could be classified into rational or irrational herding (Devnow and Welch, 1996), when an investor moves with the crowd on the assumption others are better informed than them, it is treated as rational herding whereas when investors blindly follow the crowd's investment, it is called irrational herding (Banerjee, 1992; Bikhchandani et al., 1992). It is surprising to see how powerful the driving force behind investors who irrationally herd the crowd, because they herd even when they receive enough information to prove that their herd movement is against the economic wisdom and accepted economic theories, making their movement totally irrational (Asch, 1952). When investors herd irrationally, price of stocks may even be driven away from fundamental values (Bikchandani and Sharma, 2001).

Investors do herd when the market becomes more volatile and unpredictable. During the extreme price movements (bullish and bearish period), herding gives these investors a sense of security and hope that majority's investment decisions can turn out to be good (Bartels, 1998; Kallinterakis and Ferreira, 2007). The basic driving force behind this type of herding is the human behavioural bias called loss aversion bias which causes investors to weigh more the risk of losing money than the possibility of making profits from the investment.

Normally no individual likes to be treated as a recluse by others due to social pressure or fear and therefore investors may herd and follow the crowd's investment behaviour (Liu, 2013). Some investors follow the crowd just to safeguard or establish their reputation in the society (Truman, 1994; Zwiebel, 1995; Prendergast and Stole, 1996; De Bondt and The, 1997).

Investors herd either rationally or irrationally, irrespective of the reasons; herding boosts demand for stocks which leads to market bubbles. This further fuels herding and eventually results in bursting of the bubble. These bubbles and crashes are treated as extreme market sentiments. During the bubble period, investors herd due to the greed of making more money and when the market crashes, investors herd again due to the fear of losing money (Prechter, 1999). History has proved how much damage herding could create to the economy of a nation, some of the best examples for this are Dutch Tulip mania of 1600s, Japan's bubble economy of the late 1980s, Dot-com bubble of 1990s, Wall Street Crash of 1929, 2007–08 global crisis, Greek crisis of this decade etc. Hence for a healthy market and economy, it is in everybody's interest that the market should be kept free of herding.

Studies on herding behaviour in various stock markets both developed and developing countries are in plenty. They have shown no market has been completely free from herding. During herding, investors always search for hot stocks to invest and losing stocks to sell off. But while herding, do investors look for winners based on economic, scientific and environmental factors? If the answer to this question is in the affirmative, there should be herding around specific sectors in the market. A study on industry herding is hence expected to provide an answer to this. Industry herding is defined as buying and selling stocks of same industry over a period of time by a group of investors. But compared to general herding literature, studies on industry herding are fewer in number. So far no study has been carried out in Indian stock market to inspect industry herding. This study is hence aimed to reduce the research gap by examining industry herding in Indian market.

2 Literature review

Extensive literature on herding exists, elucidating the causes and consequences of herding in equity markets worldwide. Previous studies on herding behaviour in various stock markets are mainly on herding in whole markets during extreme price movements and much less on industry herding. Some of the past studies on industry herding behaviour around the globe are discussed here.

One of the first investigations on Industry Herding behaviour of investors during stress period was examined by employing daily data from December 1925 to December 1988 from New York Stock Exchange (NYSE) and on monthly data from July 1962 to December 1988 for firms listed on American Stock Exchange. Result of the study showed that investors' investment behaviour is not influenced by the herding behaviour.

It has been proved that retail investors in USA, have a tendency to herd by considering prior returns of the industries and going after industries which perform well consistently for the past two years (Barberis and Shleifer, 2003).

Using the buy and sell data, Industry herding among investors in NASDAQ stock market in USA has been examined and findings of the study revealed that industry herding is present in US market (Jame and Tong, 2014). The study also showed that the stocks which were heavily bought by the investors in the past years and those stocks which were heavily sold by the investors in subsequent period were underperforming.

Industry wide herding behaviour in Romanian stock market has been investigated and the result indicates that herd behaviour is present in various sectors both in bullish and bearish period (Peace, 2014). Industry herding among the investors has been carried out by focusing exclusively on Turkish banking sector during the period 2007 to 2012 and enough evidence was found to support the presence of herding behaviour in investors (Cakan and Balagyozan, 2014).

Herding behaviour in Chinese stock markets was inspected to study the herding behaviour in the whole market and industry herding during the bullish and bearish period on Shanghai and Shenzhen stock exchanges during the period 1st January 1999 and 31st December 2002. The findings of the study showed the absence of herding behaviour in both the market and industry (Demirer and Kutan, 2006). Another study in Shanghai and Shenzhen stock exchange produced evidences for the industry herding in both stock exchanges but more in Shenzhen stock exchange (Lee et al., 2013). The study also showed that the herding is more in bull phase and the herding was more in Information Technology sector. Industry herding among investors towards the stocks of Malaysian companies was studied and the study produced sufficient evidence to prove industry herding among the public companies was only towards Information Technology sector and that too in bearish market (Dehghani and Sapian, 2014). Among private companies both consumer product and information technology sector were influenced by the herding behaviour and herding exists in both bullish and bearish market. Presence of market wide and Industry herding behaviour in Australian equity market on intraday has been tested and the findings showed that neither market wide nor industry wide herding behaviour was present in Australian stock market (Henker et al., 2006).

Past studies show that industry herding is quite common in most of the markets with Information Technology sector being the most sought after. Studies also show that herding behaviour, instead of giving higher returns actually lowered the returns, thus underlining the negative effect of herding on investors. Most of the previous studies on industry herding were in developed countries mainly in USA. So far no study on industry herding in Indian stock market has been done and the study of herding behaviour in India during bearish, bullish and whole period by including the soothing period also has not been attempted before. The present study hence aims to examine the presence of industry herding behaviour in Indian stock market during bullish and bearish period and to examine the presence of industry herding in Indian stock market over the whole period of study.

3 Methodology

To examine the industry herding behaviour in Indian stock market, the model developed by Christie and Huang (1995), popularly known as CH model, is used. This model is used for finding out the presence of herding behaviour during extreme price movements

alone. As herding could be during normal period also other than during the extreme price movements, the model developed by Chang Cheng and Kohruna (2000), commonly referred to as CCK model has also been employed to trace out the herding behaviour over the whole period without separating the bullish and bearish period. The present study also aims to investigate the herding behaviour during the entire period and sub intervals of yearly and quarterly periods by using the above two models.

In the CH model, presence of herding in the market during extreme market movements is measured by Cross Sectional Standard Deviation (CSSD) which is calculated as given below:

$$CSSD_t \quad \sqrt{\frac{1}{N \quad 1} \quad {}^{N}_{i \ 1} \ R_{i,t} \quad R_{m,t}}^{2} \tag{1}$$

where

N - Number of stocks considered for study

$R_{i,t}$ - observed stock return on firm i at time t

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

CSSD - Cross Sectional Standard Deviation.

This model is based on the concept that during herding, all individual stock returns approach market returns minimising CSSD in the process. To find out the bullish and bearish periods, first and third quartile of market return is computed and checked whether the return on period t lies below first quartile or above third quartile. If the return on that period lies below first quartile, then it is treated as bearish period while if the return is above third quartile, it is treated as bullish period. If the return for the period doesn't belong either to bullish or bearish period, then it is treated as a normal period. The bearish period is represented as D^L and bullish period as D^U, herding during the extreme price movements is inspected by running a multiple regression taking CSSD as a dependent variable and D^L and D^U as independent variables as given below.

$$CSSD_t \qquad {}^{L}D_t^L \qquad {}^{U}D_t^U \qquad _t \tag{2}$$

where:

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

D_t^L - equals 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 -equals one if the markets return on day t lies in the extreme upper tail of the distribution and equal to zero otherwise.

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 either of the coefficients of D^L or D^U is negative but P value is above 0.05, then it means there is no herding present during the extreme price movements.

Chang, Cheng and Khoruna (2000) uses Cross Sectional Absolute Deviation (CSAD) to detect herd behaviour in the market. CSAD value measures whether the stock returns move along with or against the market return. If the return of constituent stocks is deviating from the market return, value of CSAD increases and if the stock returns move with the market return, CSAD value decreases. This CSAD is computed as follows:

$$CSAD_t \quad \frac{1}{N} \quad {}^{N}_{i\ 1} | R_{i,t} \quad R_{m,t} | \tag{3}$$

where:

N - Number of stocks in the market

$R_{i,t}$ - observed return of stock i at time t

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

The model is based on general quadratic relationship between $CSAD_t$ and $R_{m,t}$ of the form:

$$CSAD_t \qquad {}_1 | R_{m,t} | \quad {}_2 R^2_{m,t} \quad {}_t \tag{4}$$

where:

- Average dispersion of the sample

γ- is an estimator designed to capture trader behaviour

CCK model assumes herding is associated with the presence of a non linear market with a negative value of γ2, the coefficient of the squared value of market return R^2_{mt}. Herding is statistically significant at 5% if γ2 is negative and P value is below 0.05.

The above two models discussed are usually used to find herding in the market were used in the present study to find industry herding in the market. For this N in equations (1) and (3) are defined as the number of firms in each of the industrial sectors considered for the study. Industry herding in the market for each of the sectors is determined by applying CH and CCK models by considering only the 50 stocks listed in Nifty 50 index that are categorised in the industry classification of the National Stock Exchange (NSE), the leading stock exchange of India. Before applying the variables in the two models, the respective variables are tested for stationarity and for that Augmented-Dickey Fuller (ADF) and Philip Perron (PP) tests were applied to check the presence of unit root for the respective variables.

4 Results and discussion

CH model and CCK models were used to study industry herding in Indian equity market for the period 1st April 2005 to 31st March 2015. CH model was used for finding out the presence of industry herding during the extreme price movements while CCK model was applied to know the presence of herding for the whole period by including normal period also. These two models were also used to study industry herding for the whole period, yearly and quarterly periods. Data on returns from top 50 stocks in Nifty Index as given in the industry-wise classification of NSE website was considered for the period of study. Nifty 50 was classified into 14 industrial sectors out of which four sectors had only one stock in the category which prevented the application of CH model to these sectors. Therefore the CH model was restricted to ten industrial sectors.

Table 1 Unit root test for the variables in CH model for the whole period (2005 to 2015)

Industry	*ADF test*						*PP-test*					
	CSSD	*D*	*D*1		*Du*		*CSSD*	*D*	*D*1		*Du*	
	t-statistics	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*
Automobile	–11.171	0.000	–31.836	0.000	–48.259	0.000	–52.807	0.000	–49.833	0.000	–48.656	0.000
Cement & Cement Products	–10.416	0.000	–31.836	0.000	–48.259	0.000	–57.151	0.000	–49.833	0.000	–48.656	0.000
Consumer Goods	–6.787	0.000	–31.836	0.000	–48.259	0.000	–53.424	0.000	–49.833	0.000	–48.656	0.000
Energy	–8.032	0.000	–31.836	0.000	–48.259	0.000	–52.269	0.000	–49.833	0.000	–48.656	0.000
Financial Service	–8.196	0.000	–31.836	0.000	–48.259	0.000	–52.512	0.000	–49.833	0.000	–48.656	0.000
Industrial Manufacturing	–47.802	0.000	–31.836	0.000	–48.259	0.000	–48.326	0.000	–49.833	0.000	–48.656	0.000
IT	–7.554	0.000	–31.836	0.000	–48.259	0.000	–45.990	0.000	–49.833	0.000	–48.656	0.000
Metal	–7.138	0.000	–31.836	0.000	–48.259	0.000	–57.381	0.000	–49.833	0.000	–48.656	0.000
Pharmaceutical	–16.096	0.000	–31.836	0.000	–48.259	0.000	–52.056	0.000	–49.833	0.000	–48.656	0.000
Telecom	–14.578	0.000	–31.836	0.000	–48.259	0.000	–47.299	0.000	–49.833	0.000	–48.656	0.000

Source: Computed Data

The stationarity of the variables applied in CH model has to be tested by using both Augmented-Dickey Fuller (ADF) and Philip-Perron (PP) test before applying the variables in CH model. Result of the unit root test is shown in Table 1.

As P-value of all these variables are less than 0.05, none of the variables have unit root. Hence they are applied to the CH model and the result of the analysis is shown in Table 2.

Table 2 CH Model for industry herding during bearish and bullish phases in the whole period 1st April 2005 to 31st March 2015

Industry	*Coefficient of* D^L	*t-stat*	*P-value*	*Coefficient of* D^U	*t-stat*	*P-value*
Automobile	0.004	5.676	0.000	0.004	5.528	0.000
Cement & Cement Products	0.004	6.876	0.000	0.004	7.244	0.000
Consumer Goods	0.005	10.031	0.000	0.004	9.082	0.000
Energy	0.0042	9.202	0.000	0.004	7.969	0.000
Financial Service	0.003	7.200	0.000	0.003	7.377	0.000
Industrial Manufacturing	0.001	0.777	0.437	0.001	0.836	0.404
IT	0.006	6.010	0.000	0.004	4.006	0.000
Metal	0.005	7.798	0.000	0.004	5.793	0.000
Pharmaceutical	0.005	7.495	0.000	0.005	7.508	0.000
Telecom	0.002	3.283	0.001	0.002	2.391	0.017

Source: Computed data

It can be seen from Table 2 that coefficients of D^L and D^U are positive for all the industries for the whole period. This means that there was no industry herding in Indian equity market during extreme market movements in the whole period of study. To examine whether there was industry herding for short periods, year wise analysis is also done. The result of year wise herding analysis with CH model during the bullish and bearish period is presented in Tables 3 and 4.

As none of the coefficients of D^L and D^U for any of the industrial sectors have negative value with P value less than 0.05 in any of the financial years, it can be concluded that there was no significant industry herding in the market during extreme market movements in any of the financial years between 2005 and 2015. To examine whether industry herding could have existed for much shorter periods, CH model was applied to the data for all the quarters of each financial year during the period of study. Results of quarterly analysis in bearish market and bullish market are shown in Tables 5 and 6 respectively.

Tables 5 and 6 show that there was no industry herding in most of the quarters and in most of the industrial sectors except during the bearish period of 1st January 2015 to 31st March 2015 when industry herding was present in metal sector and during the bullish period, from 1st January 2011 to 31st March 2011 in the industrial manufacturing sector. As CH model captures the industry herding in Indian market only during the extreme price movements, CCK model was applied to find out the presence of industry herding in Indian market by including the soothing period also.

Table 3 CH Model for industry herding during the bearish phases in each financial year within the period 1st April, 2005 to 31st March, 2015

Industry	*2005–06*		*2006–07*		*2007–08*		*2008–09*		*2009–10*		*2010–11*		*2011–12*		*2012–13*		*2013–14*		*2014–15*	
	Coeff.	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*
Automobile	0.001	1.291	0.004	3.423	0.007	1.330	0.007	3.237	0.006	2.936	–0.002	–0.644	0.002	1.730	0.004	3.346	0.001	0.495	–0.001	0.67422
Cement & Cement Products	0.000	–0.027	0.006	2.922	0.005	2.531	0.006	2.371	0.005	2.306	0.001	0.435	0.003	1.892	0.000	0.204	0.004	3.005	–0.001	–0.664
Consumer Goods	0.002	1.547	0.005	3.274	0.006	3.270	0.015	7.748	0.001	0.803	0.003	3.311	0.004	3.984	0.001	1.352	0.002	1.555	0.001	0.585
Energy	0.000	0.103	0.002	1.924	0.004	1.930	0.011	6.269	0.003	2.241	0.004	2.674	0.003	2.650	0.001	1.113	0.003	2.530	0.003	2.623
Financial Service	0.000	0.249	0.002	1.521	0.002	1.225	0.008	4.365	0.003	1.756	0.000	0.076	0.002	1.906	0.002	1.749	0.004	2.460	0.001	1.007
Industrial Manufacturing	0.001	0.512	0.006	3.026	0.007	–0.445	0.003	1.275	0.004	1.905	0.000	0.070	0.003	1.284	0.002	1.348	–0.004	–1.125	–0.001	–0.265
IT	0.002	2.223	0.001	0.155	0.003	1.813	0.019	2.367	0.003	1.206	–0.001	–0.594	0.002	1.493	0.000	–0.104	0.006	3.435	0.002	1.172
Metal	0.001	0.553	0.006	2.843	0.005	2.395	0.008	2.841	0.003	1.231	0.006	5.019	0.002	1.597	0.003	2.002	–0.001	–0.359	0.000	–0.221
Pharmaceutical	0.412	0.822	0.003	2.004	0.006	3.743	0.011	4.381	0.004	1.888	0.001	1.441	0.003	2.573	0.003	3.050	0.002	0.766	0.002	1.322
Telecom	0.001	0.404	0.006	3.067	0.004	1.557	0.004	1.690	0.001	0.541	0.003	1.462	0.001	0.404	0.003	1.597	0.000	0.036	0.005	1.654

Source: Computed Data

Table 4 Industry herding using CH model during the bullish phase in each financial year during the time period 1st April, 2005 to 31st March, 2015

Industry	*2005-06*		*2006-07*		*2007-08*		*2008-09*		*2009-10*		*2010-11*		*2011-12*		*2012-13*		*2013-14*		*2014-15*	
	Coeff.	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*
Automobile	0.001	1.235	0.00 3	2.122	0.013	2.675	0.007	3.276	0.005	2.566	–0.003	–0.766	0.002	1.951	0.00 2	1.599	0.002	1.726	0.002	2.345
Cement & Cement Products	0.001	0.348	0.004	2.022	0.004	1.973	0.006	2.479	0.007	3.445	0.005	2.191	0.001	0.708	0.00 0	0.199	0.004	2.807	0.002	1.562
Consumer Goods	0.001	0.614	0.002	1.298	0.004	2.139	0.009	4.986	0.007	3.810	0.003	3.212	0.004	3.181	0.00 1	0.737	0.002	1.484	0.002	1.747
Energy	0.002	2.321	0.004	3.107	0.002	1.003	0.008	4.828	0.005	3.570	0.001	0.446	0.001	0.931	0.00 2	1.836	0.001	0.422	0.004	3.527
Financial Service	0.002	2.166	0.005	3.597	0.002	1.258	0.005	2.575	0.003	1.932	–0.001	–0.665	0.001	0.630	0.00 3	2.316	0.004	2.736	0.003	2.363
Industrial Manufacturing	–0.001	–0.413	0.005	2.493	0.005	–0.318	0.003	1.217	0.006	2.694	–0.002	–0.870	0.000	0.070	0.00 4	2.210	0.000	–0.089	0.002	0.605
IT	0.003	2.605	0.001	0.195	0.005	2.759	0.007	0.860	0.005	2.011	0.000	–0.312	0.000	0.151	0.00 0	–0.157	0.005	2.988	0.001	0.936
Metal	0.000	–0.015	0.006	2.963	0.004	1.813	0.004	1.316	0.003	1.316	0.002	1.368	0.001	0.394	0.00 1	1.076	0.001	0.700	0.001	0.286
Pharmaceutical	0.007	1.815	0.005	3.500	0.006	3.707	0.009	3.530	0.003	1.321	0.002	1.660	0.001	1.400	0.00 2	1.935	0.004	1.665	0.002	1.664
Telecom	0.001	0.504	0.003	1.480	0.001	0.510	0.007	3.019	0.003	1.298	0.005	2.375	0.000	0.162	0.00 1	0.426	–0.001	–0.216	0.003	1.030

Source: Computed Data

Table 5 Quarterly analysis of industry herding behaviour using CH model during the bearish phases within the period 1st April, 2005 to 31st March, 2015

QUARTER		*Automobile*		*Cement & Cement Products*		*Consumer Goods*		*Energy*		*Financial Services*		*Industrial Manufacturing*		*IT*		*Metal*		*Pharmaceutical*		*Telecom*	
From	*To*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*
01- Apr- 05	01- Jun-05	1.953	0.055	0.002	0.700	0.004	1.714	0.000	0.165	–0.001	0.326	0.010	2.371	0.003	1.233	0.000	0.186	0.002	0.897	0.001	0.211
01- Jul-05	01- Sep-05	0.674	0.503	–0.004	1.678	0.005	1.998	0.000	0.160	0.002	0.858	–0.005	1.108	0.000	0.122	–0.002	0.872	–0.001	0.081	0.002	0.453
01- Oct- 05	01- Dec-05	0.984	0.329	0.003	1.043	0.001	0.726	0.001	0.331	0.002	0.932	–0.002	0.650	0.004	1.857	0.007	2.414	0.004	1.584	0.007	1.662
01- Jan-06	01- Mar-06	0.268	0.790	–0.003	0.824	0.001	0.274	0.001	0.811	0.001	0.283	–0.002	0.472	0.002	1.308	–0.001	0.404	0.009	2.636	–0.004	1.191
01- Apr-06	01- Jun-06	2.057	0.044	0.000	0.088	0.003	0.780	0.002	0.805	0.007	3.236	0.006	1.257	0.000	0.134	0.012	2.684	0.001	0.171	0.008	1.646
01- Jul-06	01- Sep-06	2.060	0.044	0.004	1.783	0.004	1.765	–0.001	0.409	–0.001	0.315	–0.002	0.668	0.004	2.217	0.002	0.658	0.001	0.574	0.003	1.366
01- Oct-06	01- Dec-06	0.822	0.414	0.000	0.137	0.002	0.786	0.000	0.015	0.002	0.767	–0.002	0.348	–0.008	0.582	–0.003	1.432	0.001	0.338	–0.004	1.366
01- Jan- 07	01- Mar-07	0.491	0.625	0.005	1.037	0.005	1.682	0.002	1.256	0.000	0.177	0.004	1.394	0.002	0.935	0.006	1.372	0.001	0.479	0.006	1.531
01- Apr- 07	01- Jun-07	0.898	0.373	–0.003	0.820	0.002	0.625	–0.003	1.026	–0.003	1.026	0.000	0.177	0.004	1.559	0.006	2.026	0.000	0.123	–0.003	1.065
01- Jul-07	01- Sep-07	1.153	0.256	0.006	1.344	0.004	1.149	0.000	0.028	–0.001	0.529	0.001	0.137	0.006	2.145	0.004	0.792	0.002	0.703	0.006	2.091
01- Oct-07	01- Dec-07	3.278	0.002	0.007	2.172	0.004	1.335	0.004	1.053	0.002	0.892	0.010	2.935	0.001	0.327	0.005	1.101	0.003	1.123	0.005	0.976

Table 5 Quarterly analysis of industry herding behaviour using CH model during the bearish phases within the period 1st April, 2005 to 31st March, 2015 (continued)

QUARTER		Automobile		Cement & Cement Products		Consumer Goods		Energy		Financial Services		Industrial Manufacturing		IT		Metal		Pharmaceutical		Telecom	
From	*To*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t -statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*
01-Jan-08	01-Mar-08	0.532	0.597	0.009	2.642	0.005	1.415	0.008	2.312	–0.001	0.331	0.005	1.169	0.004	0.994	–0.002	0.508	0.010	2.658	0.012	2.052
01-Jan-08	01-Jun-08	2.824	0.007	0.005	1.417	0.003	1.361	0.006	2.096	0.001	0.562	0.000	0.088	–0.006	1.523	0.004	1.186	0.009	3.389	–0.001	0.122
01-Jul-08	01-Sep-08	0.276	0.783	0.000	0.042	0.013	4.097	0.010	3.739	0.010	3.048	–0.002	0.450	0.007	1.613	0.000	0.036	0.009	2.038	0.005	1.409
01-Oct-08	01-Dec-08	0.761	0.450	0.001	0.094	0.019	3.808	0.015	3.905	0.013	2.954	0.012	1.822	0.005	0.688	0.015	2.072	0.019	3.114	–0.001	0.123
01-Jan-09	01-Mar-09	0.153	0.879	–0.005	1.001	0.001	0.200	0.005	1.404	0.000	0.002	–0.014	2.017	–0.007	1.182	–0.009	1.548	–0.003	0.539	–0.005	0.754
01-Apr-09	01-Jun-09	1.390	0.165	0.002	3.255	0.002	4.604	0.002	4.539	0.002	3.039	0.001	1.282	0.002	3.455	0.003	3.770	0.002	3.937	0.001	1.292
01-Jul-09	01-Sep-09	1.390	0.165	0.002	3.255	0.002	4.604	0.002	4.539	0.002	3.039	0.001	1.282	0.002	3.455	0.003	3.770	0.002	3.937	0.001	1.292
01-Oct-09	01-Dec-09	0.332	0.741	0.003	0.827	0.002	0.633	0.000	0.142	0.002	0.907	0.005	1.760	0.001	0.277	0.005	1.501	0.003	1.249	0.008	1.513
01-Jan-10	01-Mar-10	0.418	0.678	–0.002	0.668	–0.002	0.669	0.000	0.034	–0.002	0.883	0.002	0.637	0.003	1.068	0.002	0.521	0.002	1.197	0.000	0.028
01-Apr-10	01-Jun-10	0.630	0.531	0.000	0.060	0.002	1.103	0.003	0.992	0.001	0.927	–0.003	0.301	–0.002	0.918	0.009	3.613	0.002	0.800	–0.002	0.526
01-Jul-10	01-Sep-10	0.316	0.753	–0.004	1.208	0.001	0.491	–0.001	0.745	0.000	0.117	–0.001	0.444	–0.006	1.912	0.002	0.716	0.000	0.337	0.003	0.892
01-Oct-10	01-Dec-10	0.247	0.806	–0.001	0.166	0.005	2.485	0.005	3.447	0.000	0.133	0.002	0.623	0.007	2.432	0.002	0.741	0.001	0.529	0.005	1.728
01-Jan-11	01-Mar-11	2.354	0.022	0.006	1.810	0.005	2.099	0.001	0.387	0.000	0.076	–0.002	0.428	–0.002	1.039	0.007	2.913	–0.001	0.423	0.001	0.303
01-Apr-11	01-Jun-11	1.369	0.176	0.000	0.071	0.003	1.364	0.001	0.582	0.001	0.679	0.006	1.837	–0.001	0.256	–0.001	0.411	0.002	1.120	0.003	1.001
01-Jul-11	01-Sep-11	1.808	0.076	0.005	1.454	0.002	1.066	0.005	2.305	0.000	0.114	0.000	0.107	–0.001	0.307	0.003	1.066	0.002	1.247	–0.004	0.990
01-Oct-11	01-Dec-11	1.092	0.280	0.002	0.884	0.005	2.398	0.003	1.181	0.001	0.504	–0.005	1.187	0.006	2.554	0.003	1.135	0.004	2.183	0.002	0.603

Table 5 Quarterly analysis of industry herding behaviour using CH model during the bearish phases within the period 1st April, 2005 to 31st March, 2015 (continued)

QUARTER		*Automobile*		*Cement & Cement Products*		*Consumer Goods*		*Energy*		*Financial Services*		*Industrial Manufacturing*		*IT*		*Metal*		*Pharmaceutical*		*Telecom*	
From	*To*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*	*Coeff.*	*t-statistics*
01-Jan-12	01-Mar-12	1.075	0.287	0.003	1.124	0.006	2.371	0.000	0.182	0.002	1.112	0.009	1.804	0.001	0.348	0.005	1.559	0.003	1.322	0.002	0.342
01-Apr-12	01-Jun-12	1.961	0.055	-0.003	0.946	0.001	0.285	0.001	0.624	0.002	1.181	0.006	1.732	0.002	0.706	0.004	1.150	0.007	3.543	-0.002	0.950
01-Jul-12	01-Sep-12	1.022	0.311	0.001	0.280	0.002	0.953	0.002	0.966	-0.001	0.352	0.005	1.107	0.001	0.200	0.004	1.914	0.000	0.205	0.001	0.130
01-Oct-12	01-Dec-12	0.309	0.759	0.001	0.481	0.003	1.586	-0.001	1.033	0.002	0.982	0.003	0.735	0.000	0.222	-0.001	0.785	0.000	0.007	0.003	1.031
01-Jan-13	01-Mar-13	2.784	0.007	0.002	0.733	0.002	1.045	0.002	0.973	0.004	1.989	0.001	0.354	-0.001	0.379	0.002	0.764	0.004	2.638	0.007	1.755
01-Apr-13	01-Jun-13	0.685	0.496	0.003	1.461	0.000	0.022	0.003	1.913	0.003	1.729	-0.007	0.866	0.013	2.702	0.002	0.896	0.000	0.189	-0.002	0.544
01-Jul-13	01-Sep-13	0.728	0.470	0.009	2.599	0.001	0.570	0.006	1.747	0.005	1.424	-0.009	0.831	0.006	1.649	-0.003	0.792	-0.007	0.873	0.008	1.152
01-Oct-13	01-Dec-13	1.469	0.147	0.002	1.129	0.002	1.272	0.005	2.475	0.001	0.320	0.001	0.154	0.001	0.613	0.002	0.886	0.001	0.272	-0.008	1.562
01-Jan-14	01-Mar-14	1.272	0.208	0.001	0.418	0.002	1.481	0.001	0.494	0.004	1.571	-0.001	0.159	0.002	0.686	-0.005	1.203	0.008	2.095	0.005	1.189
01-Apr-14	01-Jun-14	0.861	0.393	-0.002	0.470	-0.004	1.474	0.000	0.101	-0.003	0.951	0.000	0.009	0.002	0.546	-0.003	0.530	0.000	0.037	0.001	0.094
01-Jul-14	01-Sep-14	0.614	0.541	-0.001	0.469	0.003	1.970	0.004	2.040	0.005	1.962	0.001	0.199	0.001	0.577	0.000	0.114	0.005	2.006	0.008	1.882
01-Oct-14	01-Dec-14	0.632	0.530	0.002	1.007	0.001	0.238	0.004	1.737	0.001	0.331	-0.009	1.541	0.004	1.228	0.003	1.030	0.002	0.809	0.011	2.327
01-Jan-15	01-Mar-15	0.072	0.943	-0.002	0.558	0.000	0.100	0.004	1.660	0.003	1.076	0.001	0.138	-0.001	0.235	**-0.005**	**2.326***	0.001	0.411	-0.003	0.488

Source: Computed Data

Table 6 Quarterly analysis of industry herding behaviour using CH model during the bullish phases within the period 1st April, 2005 to 31st March, 2015

QUARTER		*Automobile*		*Cement & Cement Products*		*Consumer Goods*		*Energy*		*Financial Services*		*Industrial Manufacturing*		*IT*		*Metal*		*Pharmaceutical*		*Telecom*	
From	*To*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*
01-Apr-05	01- Jun -05	0.001	0.707	0.005	2.147	0.000	0.057	0.005	2.443	0.003	1.281	0.003	0.612	0.005	1.855	0.001	0.491	0.002	0.804	0.002	0.760
01-Jul-05	01-Sep-05	–0.001	0.325	–0.002	0.703	0.000	0.047	0.000	0.007	0.003	1.592	–0.006	1.396	0.003	1.764	–0.007	2.813	0.019	1.328	–0.003	0.619
01- Oct-05	01- Dec-05	0.002	1.086	0.002	0.595	0.000	0.159	0.002	1.505	0.001	0.323	–0.002	0.458	0.001	0.635	0.002	0.640	0.003	1.003	0.008	1.833
01- Jan-06	01- Mar-06	0.001	0.420	–0.004	0.939	0.004	1.053	0.001	0.640	0.004	2.066	–0.001	0.243	0.004	2.045	0.004	1.070	0.001	0.201	–0.001	0.232
01-Apr-06	01 - Jun-06	0.005	1.634	0.009	1.735	–0.002	0.668	0.005	1.674	0.009	3.738	0.007	1.462	0.005	1.928	0.006	1.272	0.003	0.768	0.004	0.866
01- Jul-06	01-Sep-06	0.000	0.186	0.001	0.308	0.005	2.206	0.000	0.054	0.004	1.807	–0.002	0.746	0.004	1.736	0.001	0.428	0.001	0.823	0.002	0.806
01- Oct-06	01- Dec-06	0.000	0.050	–0.003	1.199	–0.001	0.258	0.001	0.741	–0.001	0.264	0.000	0.059	–0.008	0.597	0.002	0.704	0.000	0.194	–0.003	0.952
01-Jan -07	01- Mar-07	0.002	0.812	0.002	0.424	0.006	1.954	0.005	2.421	0.003	1.021	0.011	3.528	0.003	1.384	0.006	1.423	0.002	0.654	0.001	0.271
01-Apr-07	01- Jun-07	0.004	1.944	–0.002	0.695	0.001	0.383	0.002	0.858	0.002	0.858	0.003	1.021	0.005	2.176	0.003	1.223	0.000	–0.004	0.000	0.027
01- Jul -07	01-Sep-07	0.004	2.006	–0.003	0.649	0.002	0.635	0.002	0.803	0.001	0.346	0.007	1.282	0.003	1.116	0.002	0.361	0.005	1.573	0.005	1.997
01- Oct-07	01- Dec-07	0.008	3.385	0.007	2.502	0.006	2.072	0.004	0.980	0.002	0.943	0.007	2.135	0.008	2.313	0.005	1.075	0.008	3.369	0.006	1.280
01-Jan -08	01- Mar-08	0.035	1.828	0.009	2.584	0.000	0.095	0.004	1.174	–0.002	0.584	0.006	1.416	0.003	0.723	0.001	0.185	0.004	1.031	–0.005	0.908
01-Apr-08	01- Jun -08	0.005	1.761	0.010	2.552	0.003	1.715	0.002	0.661	0.005	2.282	0.003	0.478	0.001	0.295	0.004	1.063	0.003	0.922	0.003	0.636
01- Jul -08	01-Sep-08	0.006	1.793	0.002	0.644	0.012	3.809	0.009	3.430	0.009	2.754	–0.001	0.155	0.003	0.782	0.005	1.280	0.011	2.567	0.004	1.011
01- Oct-08	01- Dec-08	0.010	1.924	–0.002	0.241	0.012	2.441	0.010	2.527	0.006	1.435	0.003	0.526	0.000	0.014	0.007	1.006	0.013	2.194	0.009	1.559
01-Jan -09	01-Mar-09	0.001	0.150	0.003	0.670	0.012	2.514	0.005	1.286	–0.001	0.171	–0.004	0.544	0.005	0.896	–0.008	1.281	0.006	1.092	0.006	0.894
01-Apr-09	01 - Jun-09	0.002	1.979	0.003	4.203	0.002	4.818	0.002	3.323	0.002	3.496	0.001	0.886	0.001	2.274	0.002	2.716	0.002	3.524	0.001	1.458
01- Jul -09	01-Sep-09	0.002	1.979	0.003	4.203	0.002	4.818	0.002	3.323	0.002	3.496	0.001	0.886	0.001	2.274	0.002	2.716	0.002	3.524	0.001	1.458
01- Oct-09	01- Dec-09	0.000	0.094	0.005	1.485	0.003	1.329	0.002	1.157	–0.001	0.585	0.005	1.928	–0.001	0.220	0.004	1.238	–0.004	–1.633	0.006	1.033
01-Jan -10	01- Mar- 10	0.003	0.970	0.005	1.723	0.002	0.947	0.002	0.898	–0.002	1.125	0.000	0.116	–0.004	1.369	0.006	1.392	0.003	1.697	0.002	0.584

Table 6 Quarterly analysis of industry herding behaviour using CH model during the bullish phases within the period 1st April, 2005 to 31st March, 2015 (continued)

QUARTER		*Automobile*		*Cement & Cement Products*		*Consumer Goods*		*Energy*		*Financial Services*		*Industrial Manufacturing*		*IT*		*Metal*		*Pharmaceutical*		*Telecom*	
From	*To*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*	*Coefficient*	*t-statistics*
01-Apr-10	01- Jun -10	0.000	0.110	0.010	1.391	0.004	2.112	0.003	0.761	–0.001	0.437	–0.005	0.620	–0.003	1.037	0.004	1.610	0.003	0.990	0.008	1.968
01- Jul -10	01-Sep-10	–0.009	0.677	0.003	0.835	0.001	0.381	–0.002	1.109	0.001	0.501	0.000	0.165	–0.005	1.454	0.002	1.004	0.002	1.155	0.006	1.467
01- Oct- 10	01- Dec- 10	0.002	0.479	0.004	1.132	0.005	2.424	0.003	2.014	0.000	0.022	0.003	0.879	0.003	1.238	0.000	0.077	0.002	1.105	0.002	0.584
01- Jan -11	01- Mar- 11	–0.002	0.860	0.001	0.360	0.003	1.305	–0.003	0.986	–0.003	1.777	–0.010	2.541**	0.001	0.278	–0.004	1.605	–0.002	–1.186	0.001	0.306
01-Apr- 11	01- Jun -11	0.002	0.923	–0.002	0.714	0.004	1.511	0.000	0.286	–0.001	0.436	0.001	0.359	–0.002	0.641	0.000	0.113	–0.001	–0.256	0.000	0.090
01- Jul -11	01-Sep-11	0.001	0.285	0.000	0.139	0.000	0.204	0.002	0.948	–0.002	1.519	0.005	1.165	–0.001	0.276	0.000	0.147	0.003	1.594	–0.002	0.465
01- Oct- 11	01- Dec- 11	0.007	2.954	0.005	2.017	0.005	2.160	0.001	0.444	0.002	0.854	–0.001	0.198	0.003	1.322	0.001	0.478	0.002	0.922	0.004	1.086
01- Jan -12	01- Mar- 12	0.000	0.151	0.001	0.562	0.005	2.250	–0.001	0.284	0.001	0.501	0.000	0.009	0.000	0.116	0.002	0.614	0.003	1.173	–0.004	0.667
01-Apr- 12	01- Jun -12	0.000	0.039	0.000	0.075	0.000	0.097	0.003	1.686	0.002	1.428	0.007	2.047	0.000	0.075	0.001	0.262	0.003	1.368	–0.003	1.304
01- Jul -12	01-Sep-12	0.001	0.464	0.003	1.204	0.007	3.034	0.006	3.633	0.005	1.607	0.005	1.133	0.002	0.712	0.006	2.981	0.003	1.608	–0.003	0.442
01- Oct- 12	01- Dec- 12	–0.001	0.577	–0.003	1.223	–0.003	1.588	0.001	0.489	0.001	0.473	0.009	2.544	0.000	0.260	–0.001	0.710	0.002	1.104	0.007	2.380
01- Jan -13	01- Mar- 13	0.004	2.197	0.000	0.157	0.001	0.320	–0.002	0.874	0.000	0.232	–0.005	1.763	–0.001	0.349	–0.002	0.764	0.000	0.278	0.001	0.325
01-Apr-13	01- Jun -13	0.002	1.013	0.001	0.309	–0.003	0.929	0.001	0.832	0.002	1.070	–0.002	0.326	0.009	1.910	0.000	0.117	0.000	–0.072	–0.008	1.827
01- Jul -13	01-Sep-13	0.004	1.555	0.003	0.840	0.001	0.495	–0.002	0.643	0.002	0.442	–0.009	0.835	0.007	1.995	0.004	1.024	–0.004	–0.477	0.004	0.543
01- Oct- 3	01- Dec- 13	0.003	1.676	0.006	3.183	0.004	1.853	0.002	1.013	0.007	1.982	–0.002	0.429	0.002	0.712	0.000	0.172	0.006	2.695	–0.001	0.139
01- Jan -14	01- Mar- 14	–0.004	1.574	0.006	2.189	0.002	1.419	0.004	1.587	0.004	1.585	0.013	2.545	0.004	1.828	–0.002	0.517	0.004	0.927	–0.002	0.551
01-Apr-14	01- Jun -14	0.001	0.404	0.007	1.758	0.007	2.271	0.010	2.763	0.008	2.598	0.014	2.243	0.005	1.447	0.005	1.133	0.007	2.223	0.006	0.800
01- Jul -14	01-Sep-14	0.004	1.714	0.000	0.148	0.000	0.222	0.002	1.371	0.001	0.595	–0.003	0.510	0.001	0.493	–0.006	1.520	0.002	0.861	0.002	0.520
01- Oct- 14	01- Dec- 14	0.001	0.909	0.000	0.283	–0.001	0.272	0.002	0.892	0.004	1.835	–0.008	1.379	–0.001	0.379	0.002	0.605	–0.003	–1.175	0.002	0.378
01- Jan -15	01- Mar- 15	0.003	1.395	0.000	0.037	0.001	0.251	0.001	0.500	0.001	0.219	–0.001	0.328	–0.001	0.550	–0.002	0.877	0.001	0.501	0.001	0.187

Source: Computed Data

Table 7 Unit Root test for the variables applied in CCK model for the whole period

Industry	*ADF test*						*PP-test*					
	CSA	*D*	Rm_t		$R^2_{m,t}$		*CSA*	*D*	Rm_t		$R^2_{m,t}$	
	t-statistics	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*	*t-statistics*	*p-value*
Automobile	–8.084	0.000	–7.513	0.000	–9.209	0.000	–54.229	0.000	–62.619	0.000	–57.477	0.000
Cement & Cement Products	–8.786	0.000	–7.513	0.000	–9.209	0.000	–58.211	0.000	–62.619	0.000	–57.477	0.000
Chemicals	–16.111	0.000	–7.513	0.000	–9.209	0.000	–51.444	0.000	–62.619	0.000	–57.477	0.000
Constructions	–15.571	0.000	–7.513	0.000	–9.209	0.000	–47.449	0.000	–62.619	0.000	–57.477	0.000
Consumer Goods	–6.454	0.000	–7.513	0.000	–9.209	0.000	–54.512	0.000	–62.619	0.000	–57.477	0.000
Energy	–6.375	0.000	–7.513	0.000	–9.209	0.000	–52.616	0.000	–62.619	0.000	–57.477	0.000
Financial Service	–7.872	0.000	–7.513	0.000	–9.209	0.000	–54.066	0.000	–62.619	0.000	–57.477	0.000
Industrial Manufacturing	–47.114	0.000	–7.513	0.000	–9.209	0.000	–48.300	0.000	–62.619	0.000	–57.477	0.000
IT	–7.172	0.000	–7.513	0.000	–9.209	0.000	–47.847	0.000	–62.619	0.000	–57.477	0.000
Media	–16.456	0.000	–7.513	0.000	–9.209	0.000	–48.052	0.000	–62.619	0.000	–57.477	0.000
Metals	–7.220	0.000	–7.513	0.000	–9.209	0.000	–56.759	0.000	–62.619	0.000	–57.477	0.000
Pharmaceutical	–10.012	0.000	–7.513	0.000	–9.209	0.000	–52.568	0.000	–62.619	0.000	–57.477	0.000
Services	–17.327	0.000	–7.513	0.000	–9.209	0.000	–50.301	0.000	–62.619	0.000	–57.477	0.000
Telecom	–14.233	0.000	–7.513	0.000	–9.209	0.000	–47.715	0.000	–62.619	0.000	–57.477	0.000

Source: Computed Data

5 Result of CCK model

The stationarity of the variables applied in CCK model has to be inspected by using both Augmented-Dickey Fuller (ADF) and Philip-Perron (PP) test before the variables applied in CCK model. Result of unit root test is shown in Table 7.

As P-value of all the variables are less than 0.05, none of the variables have unit root. Hence they were applied to the CCK model. Table 8 gives the result of this analysis for examining industry herding in the whole market.

Table 8 CCK model for industry herding during the whole period 1st April, 2005 to 31st March, 2015

Industry	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*P-value*
Automobile	–0.044	–0.124	0.902
Cement & Cement Products	–0.468	–1.334	0.182
Chemicals	0.312	0.583	0.560
Constructions	1.078	2.377	0.018
Consumer Goods	1.899	7.117	0.000
Energy	–0.132	–0.501	0.616
Financial Service	–0.222	–0.806	0.420
Industrial Manufacturing	0.509	0.673	0.501
IT	0.868	1.854	0.064
Media	–0.322	–0.440	0.660
Metal	–0.082	–0.212	0.832
Pharmaceutical	0.381	1.253	0.210
Services	1.076	1.608	0.108
Telecom	0.457	1.120	0.263

Source: Computed Data

The result is shown for 14 industry sectors as given in NSE website. Negative γ_2 with P value less than 0.05 indicates industry herding. Table 8 shows that there was no industry herding in the market for the whole year. Year-wise analysis is also done and the result of analysis with CCK model is shown in Table 9.

It can be seen that most of the industrial sectors were free from industry herding of investors except for the year 2009-10 in the sectors of cement and energy and for the year 2012–13 in the automobile sector.

The herding and high demand for stocks in the cement and energy sector in India is quite understandable given that the country is on its path to become an economic giant and these are the two sectors that have to play a vital role in building the nation. Moreover the year 2009–10 was the period preceding the commonwealth games in Delhi and the city witnessed a lot of construction in preparation for the event. In anticipation of the demand, cement companies in India had increased the production to achieve a record growth rate of 12% during the year and the sales record show that cement sales in the country during the year had increased by 28% over the previous year. Herding in the year 2009–10 in cement sector hence could be interpreted as the faith investors placed in the good performance of the cement industry.

In the automobile sector, India is considered as a hot spot when the country makes great strides in the economic sector, more people are expected to become car owners and so true to expectations, automobile industry has been doing well. But for the first time in a decade, the year 2012–13 saw more than 6% dip in the sales due to various reasons like high interest rates, high fuel price and high inflation. So the automobile sector seems to have witnessed a sell herd for the year.

Table 9 CCK Model for industry herding in each of the financial years between 1st April, 2005 & 31st March, 2015

Industry	*2005-06*		*2006-07*		*2007-08*		*2008-09*		*2009-10*		*2010-11*		*2011-12*		*2012-13*		*2013-14*		*2014-15*	
	Coefficient of $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*	*Coefficient of* $R^2_{m,t}$	*t-statistics*
Automobile	0.371	0.080	2.008	1.270	3.256	−1.180	0.138	0.147	−0.151	−0.273	22.491	2.331	0.553	0.117	18.205	2.405**	5.525	1.543	−3.555	−0.554
Cement & Cement Products	1.873	0.295	3.020	1.120	4.458	3.223	0.926	0.820	−1.611	−2.665	−6.594	−0.751	2.844	0.524	0.097	−0.010	−5.053	−1.179	−1.026	−0.109
Chemicals	−0.326	−0.029	2.836	1.042	4.980	−1.951	−0.692	−0.354	2.033	1.873	20.852	−1.875	20.321	3.116	11.910	0.924	−4.917	−0.788	−0.464	−0.036
Constructions	−9.408	−0.868	2.861	0.980	1.854	0.722	1.938	1.442	1.136	1.520	26.323	3.408	14.558	−1.917	20.231	1.575	5.619	0.837	1.687	0.128
Consumer Goods	−1.860	−0.332	0.286	0.163	1.454	1.079	1.293	1.684	1.376	2.914	4.264	0.962	−1.055	−0.256	11.0					
Energy	2.475	0.631	4.187	2.883	3.548	2.469	−0.832	−1.076	−0.851	−1.989	−0.436	−0.085	6.256	1.589	14.401	2.101	2.703	0.667	−8.763	−1.018
Financial Service	−2.580	−0.529	2.360	1.333	2.062	1.622	−0.615	−0.741	−0.145	−0.305	2.529	0.611	−5.118	−1.371	9.484	−1.141	2.133	0.442	−1.958	−0.238
Industrial Manufacturing	19.570	2.306	3.416	1.528	0.026	−0.006	3.750	3.900	−0.757	−1.196	−2.075	−0.231	1.516	0.211	7.713	−0.683	38.791	4.190	12.199	0.808
IT	2.361	0.486	1.255	0.436	2.597	1.528	0.969	0.389	0.515	0.800	6.228	1.176	−1.074	−0.222	13.749	1.366	2.890	0.574	−4.129	−0.470
Media	−3.441	−0.200	7.546	0.988	0.942	−0.349	0.535	0.232	0.682	0.501	−3.563	−0.327	5.810	0.586	9.472	0.478	12.831	−1.474	−7.968	−0.529
Metals	1.838	0.272	3.967	1.627	1.291	0.685	1.384	1.114	−0.529	−0.747	−0.082	−0.015	−7.072	−1.199	8.700	0.947	1.519	0.242	10.483	0.857
Pharmaceutical	−4.549	−0.431	0.889	0.588	0.356	−0.297	0.477	0.536	0.157	0.294	13.360	3.418	4.978	1.460	9.039	1.444	−0.668	−0.123	4.627	0.536
Services	−0.163	−0.015	7.184	1.826	14.026	3.741	4.323	2.737	−1.445	−1.435	−4.538	−0.406	−3.630	−0.320	8.842	−0.496	11.331	0.895	34.639	−1.321
Telecom	6.479	0.769	8.513	3.691	5.425	2.758	0.408	0.462	−0.337	−0.475	1.272	0.164	−6.005	−0.842	0.058	0.004	8.534	1.165	13.718	−0.864

Source: Computed Data

Table 10 CCK model analysis of industry herding in each of the quarters between 1st April, 2005 & 31st March, 2015

Quarter		Automobile		Cement & Cement Products		Chemicals		Constructions		Consumer Goods		Energy		Financial Services		Industrial Manufacturing		IT		Media		Metals		Pharmaceutical		Services		Telecom	
From	*To*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*	*Coeff. of $R^2_{m,t}$*	*t- statistics*
01-Apr-05	01-Jun-05	0.832	0.104	4.398	0.504	11.367	0.624	4.392	0.275	0.992	0.097	2.821	0.366	7.849	0.791	36.874	2.700	12.101	1.207	43.048	1.796	1.167	0.118	7.490	0.000	29.128	1.192	3.990	0.353
01-Jul-05	01-Sep-05	–1.639	–0.223	8.398	1.013	4.647	0.237	–6.364	–0.380	3.197	0.422	2.527	0.422	0.663	0.089	18.402	1.297	0.583	0.078	42.238	1.466	11.587	1.297	–10.248	0.000	22.658	1.935	13.243	0.940
01-Oct-05	01-Dec-05	1.193	0.095	13.328	0.720	–27.864	–0.909	–24.911	–0.887	6.282	0.487	22.543	2.336	4.554	0.315	15.193	0.690	6.609	0.466	–20.849	–0.440	16.968	0.882	–8.093	0.000	–2.005	–0.087	59.648	2.068
01-Jan-06	01-Mar-06	16.077	0.824	32.221	1.050	28.033	0.615	91.145	1.774	41.347	1.568	8.791	0.559	20.407	1.235	3.994	0.114	0.904	0.058	106.310	1.418	6.364	0.215	9.115	0.000	4.284	0.103	11.926	0.425
01-Apr-06	01-Jun-06	1.479	0.534	3.342	0.677	10.358	2.190	0.185	0.033	1.382	0.427	4.887	1.809	0.360	0.161	1.397	0.356	1.054	0.375	2.755	0.341	3.265	0.725	5.498	0.000	2.867	0.534	7.213	1.757
01-Jul-06	01-Sep-06	7.551	1.153	–0.619	–0.083	–5.421	–0.450	9.681	0.810	–3.649	–0.509	16.407	2.260	–5.017	–0.595	–8.455	–0.940	1.551	0.216	-22.930	-1.109	6.294	0.718	-14.996	0.000	5.098	0.416	9.617	1.244
01-Oct-06	01-Dec-06	11.070	1.405	23.472	2.628	12.941	1.094	3.634	0.319	0.918	0.117	12.141	2.083	24.013	2.467	23.741	1.819	26.925	0.955	46.192	0.947	17.755	1.815	4.973	0.000	8.236	0.464	5.784	0.539
01-Jan-07	01-Mar-07	3.484	0.560	11.065	0.866	16.670	1.493	0.303	0.030	2.116	0.341	3.650	0.823	8.484	1.033	7.108	0.980	2.740	0.431	4.860	0.114	1.778	0.184	20.671	0.000	43.880	1.955	6.606	0.715
01-Apr-07	01-Jun-07	5.927	1.532	5.847	0.803	1.376	0.175	5.237	0.523	1.312	0.263	7.488	2.228	3.902	0.765	13.637	0.165	7.453	1.457	18.784	1.571	2.071	0.356	17.031	0.000	2.143	0.124	4.543	0.817
01-Jul-07	01-Sep-07	3.817	0.901	14.092	2.123	9.045	0.867	2.693	0.318	3.608	0.736	0.049	0.010	6.304	1.656	11.900	1.625	0.805	0.119	7.445	0.806	8.880	1.208	7.900	0.000	4.311	0.401	4.852	1.130
01-Oct-07	01-Dec-07	3.807	0.873	2.901	0.707	5.107	0.537	10.377	0.956	5.576	1.116	0.629	0.101	6.216	1.453	2.223	0.412	10.212	1.463	1.472	0.174	4.440	0.652	8.751	0.000	2.493	0.147	7.258	0.882

Table 10 CCK model analysis of industry herding in each of the quarters between 1st April, 2005 & 31st March, 2015 (continued)

Quarter		*Automobile*		*Cement & Cement Products*		*Chemicals*		*Constructions*		*Consumer Goods*		*Energy*		*Financial Services*		*Industrial Manufacturing*		*IT*		*Media*		*Metals*		*Pharmaceutical*		*Services*		*Telecom*	
From	*To*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*
01-Jan-08	01-Mar-08	10.670	1.541	3.291	1.840	4.188	0.974	5.657	1.406	2.808	1.314	3.585	1.945	2.610	1.335	3.756	1.581	5.024	2.030	4.497	0.915	2.863	0.9 44	6.02 5	0.0 00	21.7 21	4.6 45	8.719	2.7 83
01-Apr-08	01-Jun-08	0.522	0.064	13.251	1.349	2.290	0.1 14	21.7 10	1.275	5.56 0	0.9 25	3.66 7	0.4 23	5.45 1	0.8 12	5.58 3	0.4 19	4.74 7	0.4 17	10.0 65	0.5 62	1.986	0.185	7.02 6	0.0 00	16.9 57	0.8 96	8.04 8	0.7 87
01-Jul-08	01-Sep-08	4.00 6	0.7 93	6.30 7	1.189	0.01 7	0.0 01	2.70 0	0.4 07	6.47 2	1.328	3.86 2	1.0 12	4.91 2	0.9 58	4.88 2	0.9 53	0.18 5	0.0 27	5.30 5	0.5 23	3.88 8	0.6 18	8.48 7	0.0 00	6.65 4	0.7 69	4.93 6	1.090
01-Oct-08	01-Dec-08	0.56 2	0.3 93	0.72 7	0.3 81	3.48 5	1.050	2.87 5	1.304	0.89 8	0.6 80	0.57 4	0.4 91	1.49 5	1.142	3.54 0	2.4 07	3.12 2	1.5 22	0.92 2	0.3 00	0.62 2	0.2 82	7.66 0	0.0 00	6.73 6	2.6 00	0.32 6	0.2 20
01 Jan-09	01-Mar- 09	2.15 8	0.5 03	7.12 3	1.137	22.130	3.256	4.00 1	0.6 05	5.52 5	1.760	5.02 5	1.148	7.087	1.560	11.105	2.489	111.135	6.819	15.709	0.944	1.968	0.351	8.896	0.000	3.080	0.413	6.807	1.847
01-Apr-09	01-Jun-09	0.237	0.248	0.836	0.821	3.376	1.453	3.423	2.233	1.288	1.428	0.577	0.798	1.100	1.296	1.244	0.961	1.165	1.006	5.370	2.232	1.391	1.079	7.735	0.000	0.264	0.129	0.052	0.040
01-Jul-09	01-Sep-09	3.343	0.683	5.486	1.117	4.884	0.681	9.619	2.229	13.830	3.878	3.835	1.083	2.605	0.929	0.367	0.096	1.376	0.266	1.676	0.138	0.210	0.040	8.01 0	0.000	1.290	0.195	6.986	1.797
01-Oct-09	01-Dec-09	2.373	0.278	5.662	0.478	5.959	0.274	1.405	0.132	1.405	0.132	8.987	1.138	3.597	0.437	3.224	0.363	5.761	0.578	6.818	0.225	17.596	1.498	6.807	0.000	10.694	0.717	5.961	0.328
01-Jan-10	01-Mar-10	11.210	0.847	12.144	0.858	10.243	0.454	13.085	0.891	3.738	0.339	1.976	0.184	1.209	0.131	4.347	0.279	17.115	1.108	4.544	0.170	2.200	0.117	6.768	0.000	20.351	0.712	5.141	0.273
01-Apr-10	01-Jun-10	25.295	3.476	9.624	0.446	25.332	1.281	24.465	1.504	3.523	0.416	0.650	0.055	6.032	1.197	0.268	0.011	9.009	0.970	3.752	0.190	1.790	0.174	7.582	0.000	9.320	0.737	13.569	0.923
01-Jul-10	01-Sep-10	77.905	0.936	57.535	1.447	54.956	0.953	59.943	1.883	36.209	1.871	11.618	0.574	6.429	0.335	29.711	1.135	10.852	0.379	9.237	0.227	11.069	0.503	8.560	0.000	110.532	2.659	1.013	0.028

Table 10 CCK model analysis of industry herding in each of the quarters between 1st April, 2005 & 31st March, 2015 (continued)

Quarter		Automobile		Cement & Cement Products		Chemicals		Constructions		Consumer Goods		Energy		Financial Services		Industrial Manufacturing		IT		Media		Metals		Pharmaceutical		Services		Telecom	
From	*To*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*
01-Oct-10	01-Dec-10	10.656	0.519	8.360	0.328	36.562	0.847	10.168	0.466	15.813	1.161	7.090	0.654	6.262	0.376	9.825	0.464	2.803	0.155	17.199	0.605	7.569	0.385	7.924	0.000	21.120	0.370	12.910	0.620
01-Jan-11	01-Mar-11	6.810	0.801	8.651	0.788	16.445	1.161	31.277	2.338	5.665	0.705	2.884	0.327	5.169	0.743	1.177	0.092	11.402	1.504	24.527	1.067	0.317	0.036	8.772	0.000	14.017	1.099	0.256	0.018
01-Apr-11	01-Jun- 11	0.396	0.032	23.613	1.402	12.673	0.692	12.572	0.564	1.913	0.137	7.981	0.755	4.917	0.530	10.711	0.633	1.701	0.128	15.190	0.475	3.337	0.300	8.080	0.000	3.551	0.202	4.748	0.267
01-Jul-11	01-Sep-11	5.774	0.757	2.958	0.292	18.117	1.855	18.758	1.918	3.533	0.600	4.676	0.778	4.914	1.063	0.868	0.096	1.284	0.145	26.744	2.199	15.097	1.620	7.941	0.000	8.332	0.592	4.361	0.354
01-Oct-11	01-Dec-11	0.619	0.063	7.475	0.704	8.712	0.527	37.045	1.866	5.868	0.629	0.449	0.045	5.145	0.536	11.535	0.671	5.243	0.494	13.382	0.636	5.900	0.456	9.469	0.000	36.553	1.506	3.674	0.281
01-Jan- 12	01-Mar-12	17.979	1.199	11.466	0.860	6.678	0.371	19.404	0.873	0.105	0.009	11.072	0.990	4.212	0.348	2.642	0.105	5.279	0.406	24.891	0.739	11.508	0.613	8.347	0.000	56.072	1.305	20.733	0.905
01-Apr-12	01-Jun-12	23.038	1.504	5.866	0.308	9.061	0.440	28.604	0.978	18.243	1.490	8.219	0.720	16.223	1.690	23.165	1.165	24.578	1.345	44.102	1.583	16.663	0.872	8.208	0.000	26.502	1.017	3.675	0.236
01-Jul-12	01-Sep-12	14.103	1.101	2.125	0.134	8.970	0.420	30.356	1.414	11.125	0.643	13.627	1.188	10.189	0.455	3.961	0.164	44.343	2.773	58.876	1.599	37.858	2.815	8.368	0.000	0.840	0.024	20.471	0.653
01-Oct-12	01-Dec-12	39.085	1.317	23.364	0.670	89.823	1.699	4.283	0.111	18.567	0.556	13.096	0.721	6.652	0.259	7.122	0.160	57.333	2.096	55.261	0.663	7.784	0.269	6.012	0.000	6.844	0.089	8.232	0.210
01-Jan-13	01-Mar-13	37.234	1.677	33.013	1.015	18.748	0.362	10.716	0.273	7.491	0.287	13.196	0.483	13.738	0.541	29.813	0.931	56.451	1.286	87.729	1.260	2.021	0.059	14.995	0.000	21.533	0.336	7.047	0.145

Table 10 CCK model analysis of industry herding in each of the quarters between 1st April, 2005 & 31st March, 2015 (continued)

Quarter		*Automobile*		*Cement & Cement Products*		*Chemicals*		*Constructions*		*Consumer Goods*		*Energy*		*Financial Services*		*Industrial Manufacturing*		*IT*		*Media*		*Metals*		*Pharmaceutical*		*Services*		*Telecom*	
From	*To*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*	*Coeff. of $R^2_{m,t}$*	*t-statistics*
01-Apr-13	01-Jun-13	14.741	1.307	2.769	0.277	12.268	0.771	15.454	0.692	2.414	0.162	7.129	0.754	1.743	0.176	39.252	1.184	24.890	1.257	4.482	0.162	15.030	1.063	8.827	0.000	1.695	0.037	0.939	0.049
01-Jul-13	01-Sep-13	6.288	1.170	-9.601	-1.204	-2.469	-0.247	12.917	1.163	-0.212	-0.035	4.194	0.513	1.232	0.142	71.167	4.429	3.009	0.365	-11.008	-0.753	-13.291	-1.189	-7.961	0.000	32.178	1.729	4.009	0.289
01-Oct-13	01-Dec-13	14.922	1.303	2.257	0.148	38.285	1.482	10.575	0.316	6.662	0.494	24.651	1.947	47.178	2.034	57.654	2.079	13.087	0.786	45.513	1.088	5.749	0.264	8.961	0.000	1.239	0.025	22.627	0.707
01-Jan-14	01-Mar-14	58.076	2.245	14.683	0.502	68.141	1.519	63.068	1.907	29.929	2.194	10.555	0.507	17.049	0.696	29.633	0.672	54.200	2.437	36.916	0.793	30.251	0.706	7.868	0.000	163.504	2.005	87.249	2.648
01-Apr-14	01-Jun-14	2.519	0.219	7.171	0.348	18.682	0.637	17.882	0.705	8.690	0.518	29.089	1.342	7.577	0.431	43.441	1.436	9.707	0.528	12.345	0.390	5.978	0.213	5.912	0.000	52.966	0.837	30.823	0.867
01-Jul-14	01-Sep-14	12.537	0.483	40.847	1.319	38.373	0.843	61.028	1.131	42.745	2.103	15.091	0.721	34.855	1.358	176.196	3.484	24.357	1.209	8.524	0.167	91.306	2.005	8.030	0.000	180.322	2.245	19.651	0.487
01-Oct-14	01-Dec-14	27.659	1.347	10.076	0.523	3.168	0.097	27.155	0.854	25.196	0.929	27.298	1.056	7.893	0.300	124.277	2.116	30.343	0.749	118.478	2.140	28.451	0.773	8.030	0.000	174.627	2.178	1.899	0.041
01-Jan-15	01-Mar-15	6.744	0.671	10.981	0.699	23.215	1.274	3.366	0.155	8.170	0.553	4.195	0.341	4.026	0.286	19.416	1.042	2.786	0.219	25.789	1.315	20.991	1.637	9.778	0.000	52.498	1.549	18.805	0.666

Source: Computed Data

In the year-wise analysis some of the industrial sectors showed some degree of herding present but not significant because of P-value being greater than or equal to 0.05. Therefore the same model was used for quarterly analysis to find out industrial herding. Result of quarterly analysis is shown in Table 10.

Industry wise analysis for quarter periods has sprung up a surprise with herding found in the third quarter in some sectors. Thus there was herding in energy sector in the third quarter of 2006–07, in the financial and industrial manufacturing sectors during the third quarter of 2013–14 and in the services sector in the third quarter of 2014–15. This herding in the last quarter of a financial year may be attributed to "December effect" in stock markets worldwide. Historically December is found to be the best month for stock performance. This is the month of Christmas and in US and Europe this is the season when investors buy, sell and earn more. In US this is also the month when companies book their profits. But then this effect has been observed only in 2006 in the years prior to 2013. Industry herding observed in the third quarters after 2013 hence could be construed as indication of growing influence of FIIs in Indian stock market.

In sector-wise analysis there was herding in the year 2009–10 in the sectors of cement and energy and for the year 2012–13 in the automobile sector, but quarterly analysis for the sectors, did not show any herding in any quarter for these years. Similarly in the quarterly analysis, while herding was observed in the third quarter of 2006–07 in energy sector, whereas in the financial and industrial manufacturing sectors during the third quarter of 2013–14 and in the services sector in the third quarter of 2014–15 there was no herding in these sectors when these financial years are considered as a whole. In short, these results show that herding in a year does not necessarily mean that there should be herding in at least one of the constituent quarters and the reverse was also true. That is herding in a quarter may not necessarily produce herding in the financial year of which that quarter is a part. 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} in the quadratic equation and concludes herding if the coefficient is negative with a significant P-value which is less than 0.05. This means for different time intervals and consequently different data, the values of the coefficient and hence conclusions could also be different. This also explains why industry herding observed with CH models in two extreme price movements of two quarters have not been observed for the same period with CCK model.

6 Conclusion

The present study shows on the whole, there was no significant level of herding in any of the industrial sectors examined. But a couple of years and few quarter periods here and there showed significant herding in some of the sectors. These sectors have recorded excellent growth in India during the periods when their stocks showed herding at 5% level of significance. Herding behaviour of investors during the quarter periods have been attributed to festive periods in the country when investors are investing passionately and looking forward to a new year optimistically. Even then the choice of sectors to invest has been shown to be economically sensible. All these prove that the

Indian equity market is generally free of industrial herding and even when it showed some level of herding; it is seen that herding in industrial sectors is based on sound economic wisdom.

References

Asch, S. (1952) *Social Psychology*, Prentice Hall, Englewood Cliffs, NJ.

Banerjee, A.V. (1992) 'A simple model of herd behaviour', *The Quarterly Journal of Economics*, Vol. 107, No. 3, pp.797–817.

Barberis, N. and Shleifer, A. (2003) 'Style investing', *Journal of Financial Economics*, Vol. 68, No. 1, pp.161–199.

Bartels, L.M. (1988) *Presidential Primaries and the Dynamics of Public Choice*, Princeton University Press, Princeton NJ.

Bikchandani, S. and Sharma, S. (2001) 'Herd behaviour in financial markets', Working Paper, *IMF Staff papers*, Vol. 47, No. 3, pp.279–310.

Bikchandani, S., Hirshleifer, D. and Welch, I. (1992) 'A theory of fads, fashion, custom and cultural change as informational cascades', *The Journal of Political Economy*, Vol. 100, No. 5, pp.992–1026.

Chang, E.C., Cheng, J.W. and Khorana, A. (2000) 'An examination of herd behavior in equity markets: an international perspective', *Journal of Banking & Finance*, Vol. 24, No. 10, pp.1651–1679.

Christie, W.G. and Huang, R.D. (1995) 'Following the pied piper: do individual returns herd around the market', *Financial Analysts Journal*, Vol. 51, No. 4, pp.31–37.

Dehghani, P. and Sapian, R.Z.Z. (2014) 'Sectoral herding behaviour in the aftermarket of Malaysian IPOs', *An International Journal of Entrepreneurial Finance*, Vol. 16, No. 3, pp.227–246.

Devnow, A and Welch, I. (1996) 'Rational herding in financial economics', *European Economic Review*, Vol. 40, No. 3, pp.603–615.

De Bondt, W.F.M. and Forbes, W.P. (1999) 'Herding in analyst earnings forecasts: evidence from the United Kingdom', *European Financial Management*, Vol. 5, No. 2, pp.143–163.

Demirer, R. and Kutan, A.M. (2006) 'Does herding behavior exist in Chinese stock markets?' *Journal of International Financial Markets, Institutions and Money*, Vol. 16, No. 2, pp.123–142.

Froot, K.A., Scharfstein, D.S. and Stein, J.C. (1992) 'Herd on the street: informational inefficiencies in a market with short-term speculation', *The Journal of Finance*, Vol. 47, No. 4, pp.1461–1484.

Henker, J., Henker, T. and Mitsios, A. (2006) 'Do investors herd intraday in Australian equities?' *Economic Theory*, Vol. 22, No. 3, pp.196–219.

Jame, R. and Tong, Q. (2014) 'Industry-based style investing', *Journal of Financial Markets*, Vol. 19, pp.110–130.

Kallinterakis, V. and Kratunova, T. (2007) 'Does thin trading impact upon the measurement of herding? Evidence from Bulgaria', Working Paper, *Ekonomia*, Vol. 10, No. 1, pp.1–31.

Lee, C.C., Chen, M.P. and Hsieh, K.M. (2013) 'Industry herding and market states: evidence from Chinese Stock Markets', *Quantitative Finance*, Vol. 13, No. 7, pp.1091–1113.

Liu, S. (2013) *An empirical analysis of herd behavior in the Singapore stock market*, Master of Finance, Saint Mary's University, Canada.

Pece, A. (2014) 'The herding behavior on small capital markets: evidence from Romania', *Annals of Faculty of Economics*, Vol. 1, No. 1, pp.795–801.

Prechter, R.R. (1999) 'The wave principle of human social behavior and the new science of socionomics', *AEW Classics Library*, Vol. 1, No. 1.

Prendergast, C. and Stole, L. (1996) 'Impetuous youngsters and jaded old-timers: acquiring a reputation for learning', *Journal of Political Economy*, Vol. 104, No. 6, pp.1105–1134.

Truman, B. (1994) 'Analyst forecasts and herding behaviour', *The American Economic Review*, Vol. 80, No. 2, pp.58–62.

Zwiebel, J. (1995) 'Corporate conservatism and relative compensation', *Journal of Political Economy*, Vol. 103, No. 1, pp.1–25.