

Investigation of Stock Herding in Indian Food Processing Sector

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Abstract

The present study was undertaken to examine the herding in stocks of food processing sector in India. Herding behaviour - rational or irrational may lead to errors and misvaluation of assets. Investigating and measuring the level of herding on institutional investors trading could shed light on different phenomena such as excess volatility, price momentum, systematic errors in expectations causing systematic market misvaluations. Herding behaviour arise mainly because investors have bounded rationality, which is one of the most important fact in behavioural finance study. For the purpose of study, secondary data on daily closing was collected. The sample under analysis consisted of 42 companies of Indian food processing sector listed on the Bombay Stock Exchange. The study was carried out for the period of 5 years, from year 2015-16 to 2019-20. Collection of daily price data from 07.01.2015 to 03.01.2020 yielded 1222 data records. To examine the herding, two models are used i.e. Christie & Huang (1995) and Chang et al. (2000). By using CSAD model the findings revealed the existence of herding behaviour in 2019-20 food processing stocks in the down market condition. The results of study revealed that no herding in food processing stocks, for 5 year data, from 2015-16 to 2019-20 at 10 percent level criterion.

Keywords. Food Processing Sector, Herding, India, Stock market, Stock Exchange

1. Introduction

Herding, or the deliberate mimicking of the decisions of other agents after such decisions have been observed, is a widespread social phenomenon. Throughout the animal kingdom, herding is a natural instinct as it provides safety from predators. Parallel to the phenomenon in the animal kingdom in context of financial market herding can be termed as the

tendency of the investors to imitate the action of other investors so as to seek safety from the adverse movements in the market. Herding affects the risk and return models (Tan et al., 2008), affects stock prices (Nofsinger & Sias, 1999), determines asset prices (Bikchandani & Sharma, 2000) and exacerbates the volatility and liquidity in financial market (Dewan & Dharni, 2019). Food processing industry has an important role to play in linking the farmers to

the final consumers in the domestic as well as the international markets. The food processing industry consists of processing of fruits and vegetables, dairy, edible oils, meat and poultry, fisheries, non-alcoholic beverages, alcoholic beverages, confectionery, grains processing, packaged and convenience food and floriculture. Present study has been undertaken to investigate the existence of herding in Indian food processing sector.

2. Review of Literature

Massa & Patgiri (2005) examined the theory of managerial herding based on reputational and career concerns by focusing on the mutual fund industry and studying how incentives included in managers' contracts affect the magnitude of risks taken by managers and their herding. Voronkova & Bohl (2005) investigated the degree of herding by pension fund investors and whether they engage in feedback trading behaviour as well as their effects on prices in the developing stock market of Poland, where such investors face limitations in their investment activity. Herding is detected in both past winners and past extreme losers; however, they do not find a significant effect on the prices of Polish stocks due to herding and positive feedback trading by the institutions. Sharma et al. (2006) suggested that institutions herding behaviour created temporary price pressures, thereby probably contributing to the bubble. Walter & Weber (2006) investigated the impact of mutual fund herding on stock prices, the authors found that herding seems to neither

destabilise nor stabilise stock prices. Herding behaviour has been observed in both rising and falling market conditions in Chinese stock markets (Tan et al., 2008). Evidence of better detection of intentional herding has been reported in Spanish financial markets (Blaasco & Ferrenuela, 2008). Dasgupta et al. (2010) investigated the impact of institutional herding on asset prices. Steen & Gjolberg (2012) concluded that commodity prices exhibited excessive co-movements and that commodity markets were characterized by herd behaviour. Herding as a phenomenon in financial markets, has been researched widely across the global markets. There are number of research studies available in this regard. Presence of herding has been reported in Spain (Blasco et al., 2012), Iran (Ghallandari & Ghahremanpour, 2013), Chinese A share market (Lee et al, 2013) and global stock indices (Chen, 2013). Behavioural finance which considers the human behaviours in finance is a quite new area. In the Asian context, herding behaviour has been investigated as indicated by various contribution such as Indian stock market (Garg & indal, 2014), Ho Chi Minh city in Vietnam (Ngoc, 2014) & China (Chen et al., 2015). Evidence of significant positive correlation between extent of herding and profits. Amman Stock Exchange (ASE) was investigated for herding by (Ramadan, 2015). Various industrial sectors of Turkey were investigated for herding (Cakan & Balagyozyan, 2016). Findings of the research indicated the presence of herding in Turkish stock markets during the phase of high volatility. The

methodology based on nonlinear model promoted by Chang et al. (2000) was leveraged by Chong et al. (2017). To understand the underlying causes for herding behaviour, findings of the study provided the evidence of presence of herding both in rising and falling markets. Stock markets of central and east European economies were investigated for herding by Pochea et al. (2017). Findings of the study based on daily price data of more than 300 companies for a period of ten years, indicated the presence of herding in the stock market. Schmitt & Westerhoff (2017) concluded that the use of commonly employed technical analysis rules for making investment decisions may lead to similar buy/sell decisions across various categories of investors. Presence of herding has also been investigated in the ethical investments as per Shariah practices by Stavroyiannis & Babalos (2017). Benefits available from herding have been investigated by various researchers. A study conducted by Bhattacharya & Sonaer (2018) revealed that mutual funds basing their investment decision as per herding may end up earning negative abnormal returns. Similar negative returns were not observed for the funds not following the herding pattern. Effect of herding fear on the investor decision has been investigated by Economou et. al. (2018) in the context of stock markets from the developed economies. Popescu & Xu (2018) examined whether mutual fund managers' career concerns contribute to their herding behaviour. Chauhan et al. (2019) examined the small and large-cap stocks for the effect of herding. Examination of

stock markets in India for herding and appraisal of its intensity based on asymmetries in the market has been undertaken by Shrotryia & Kalra (2019). The positive herding coefficients signify divergent trading stemming from apparent rationality of the Indian investors. Although the presence of research efforts for investigating in Indian financial markets cannot be refuted but overall these efforts are inadequate and provide scope for more research to supplement the existing body of knowledge. Present research is an attempt to investigate the presence of herding in Indian Food Processing Sector.

3. Research Methodology

For investigating the herding behaviour in Indian food processing sector, secondary data has been used. Population of the study consisted of all food processing companies listed on Bombay stock exchange. Based on the availability of data, forty two companies were included in the sample of the study. For detecting herding in the selected stocks daily closing prices were collected for a period of five years of spanning from 2015-16 to 2019-20. Secondary data used in the study has been collected from the website of Bombay Stock Exchange (www.bse.india.com). Collection of daily price data from 07.01.2015 to 03.01.2020 yielded 1222 data records. These observations were adjusted for any bonus issues or stock splits during the period for correct analysis. Data analysis was performed for the complete five

year data set as well as single year data sets.

3.1 Analysis of herding behaviour

To examine the industry herding behaviour in Indian stock market, the model developed by Christie & Huang (1995) and Chang et al. (2000) are used. Both models analyse

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

Here, $R_{i,t}$ is the observed stock return of firm i at time t , $R_{m,t}$ is the cross-sectional average return of the market portfolio at time t , and N is the number of stocks in the market portfolio. Next, the CSSD of return is regressed against a constant and two dummies, in order to identify the extreme market phases. Here, D^L equals 1 if it lies in the extreme 1%, 5% and 10% lower tail of the same distribution, and is equal to zero otherwise.

The same holds for D^U in the case of the upper tail:

$$CSSD_t = a + b_1 D_t^L + b_2 D_t^U + e_t$$

Where a coefficient denotes the average dispersion of the sample excluding the regions corresponding to the two dummy variables. According to this approach, herding behaviour is present in the case of statistically significant negative values for b_1 and b_2 . It contrasts with rational asset pricing models, which predict an increase in dispersion because individual assets differ in their sensitivity to the market return. Despite of being an intuitive measure of capturing herding, it has been remarkably affected by the existence of outliers. As a

consequence, Christie & Huang (1995) proposed the use of the cross-sectional absolute deviation (hereafter referred to as CSAD), as a more solid measure of return dispersion:

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

Here, N is the number of firms in the aggregate market portfolio, $R_{i,t}$ is the observed stock return on firm i for day t , and $R_{m,t}$ is the cross-sectional average return on day t . Relating this to equation results in the following:

$$CSAD_t = a + b_1 D_t^L + b_2 D_t^U + e_t$$

Again, D^L equals 1 if it lies in the extreme 1%, 5% and 10% lower tail of the same distribution, and is equal to zero otherwise. The same holds for D^U in the case of the upper tail. Alternatively, Chang et. al. (2000) proposed a related approach to the one suggested by Christie & Huang (1995), using the entire distribution of market returns. It is stated in the following equation:

$$CSAD_t = a + \gamma_1 |R_{m,t}| + \gamma_2 R_{m,t}^2 + \varepsilon_t$$

The above mentioned equation investigates the relationship between CSAD market return. As per Capital Asset Pricing Model (CAPM) dispersions of the returns is having linear relationship to market return. Therefore, positive value of coefficient γ_1 is an indication of no herding. During the phases of extreme market movements the dispersion of returns will move at a disproportional rate. For capturing the nonlinear relationship, squared market return has been introduced in the equation

as an additional term through the estimate of the coefficient

4. Findings

Descriptive statistics for the returns of

the securities of the Indian stock market are presented in Table 1. The table also presents descriptive statistics for CSSD and CSAD, the dependent variables in the models employed throughout the subsequent analysis.

Table 1: Summary Statistics (Food Processing Data of 5 years) (n=1222)

Parameter	CSSD	CSAD	Market Return
Mean	0.0330	0.0216	0.0011
Std Dev	0.0642	0.0186	0.0130
Std Err Mean	0.0018	0.0005	0.0004
Upper 95% Mean	0.0366	0.0227	0.0018
Variance	0.0041	0.0003	0.0002
Skewness	22.8862	21.6233	10.5145
Kurtosis	550.3057	511.9970	199.3551
CV	194.5356	86.3096	1221.2071
Range	1.7104	0.4971	0.3156
Interquartile Range	0.0076	0.0055	0.0095

Table 1 presents the descriptive statistics for the various stocks included in the sample. Market returns have been presented at their mean value, standard deviation and other summary statistics. Further the table presents summary statistics for CSSD and CSAD of the selected stocks. In subsequent analysis CSSA and CSAD have been used as the dependent variables. Table 2 presents the results pertaining to regression models for CSSD data based on five years data sets. For employing the

regression model, extreme lower and upper tail have been considered as one percent of total observations and ten percent of total observation. For one percent upper and lower tail regression model, the value of F -statistic (31.25, $p < 0.0001$) indicates the presence of significant explanatory variables. Further, it can be seen from table 2 that coefficients of D_L and D_U are positive and further the coefficient of D_U is significant. This indicates absence of herding at 1 percent level of significance.

Table 2 : Regression Model for CSSD (Five Year Data)(n=1222)

Extreme market phase		Constant	D _L	D _U	F-Ratio (Prob> F)
1%	Estimate	0.0295	0.0031	0.0647	31.2578 (<.0001*)
	Std Error	0.0019	0.0083	0.0082	
	t-ratio	15.65	0.37	7.91	
	Prob> t	<.0001*	0.7087	<.0001*	
5%	Estimate	0.0290	0.0019	0.0208	9.4905 (<.0001*)
	Std Error	0.002151	0.006182	0.004789	
	t-ratio	13.50	0.32	4.34	
	Prob> t	<.0001*	0.7475	<.0001*	
10%	Estimate	0.0298	0.0083	0.2854	160.3027 (<.0001*)
	Std Error	0.0016	0.0173	0.0159	
	t-ratio	18.10	0.48	17.90	
	Prob> t	<.0001*	0.6329	<.0001*	

For 5 percent criterion, value of F statistic came out to be 9.4905 (p <0.0001) indicating presence of significant explanatory variables. At 5 percent criterion regression coefficients of dummy variables, i.e., D_L is not significant but positive and D_U is significant but positive. This indicates no herding in food processing stocks, for five-year data, for five years from 2015-16 to 2019-20 at 5 percent level criterion. For 10 percent criterion, value of F statistic came out to be 160.3027 (p <0.0001) indicating presence of significant explanatory variables. At 10 percent criterion regression coefficients of dummy variables, i.e., D_L is not significant but positive and D_U is significant but positive. This indicates no herding in food processing stocks, for five-

year data, for five years from 2015-16 to 2019-20 at 10 percent level criterion. Similar regression models were run for one year sets but detailed model descriptions is not presented for economizing space.

Table 3 presents the results of regression models for CSAD data for five-year data set. Regression equations are fitted for detecting overall herding, herding in up market, and herding in down market. It can be seen from Table 3 that for overall data, coefficient of R²_{m,t} is positive and significant at one percent level of significance. For up market, coefficient of R²_{m,tb} is positive but not significant at five percent level of significance.

Table 3 : Regression Model for CSAD (Five year data)(n=1222)

Extreme market phase		Constant	$ R_{m,t} $	$ R^2_{m,t} $	F-Ratio (Prob> F)
Overall	Estimate	0.0179	0.4126	5.7150	9076.913 <.0001*
	Std Error	0.0002	0.0251	0.1167	
	t-ratio	89.61	16.44	48.96	
	Prob> t	<.0001*	<.0001*	<.0001*	
Up Market	Estimate	0.0185	0.2332	0.2332	77.4001 <.0001*
	Std Error	0.0003	0.0545	1.7162	
	t-ratio	65.80	4.27	1.53	
	Prob> t	<.0001*	<.0001*	0.1256	
Down Market	Estimate	0.0169	0.6892	0.2854	8424.859 <.0001*
	Std Error	0.0003	0.0360	0.0159	
	t-ratio	60.51	19.13	17.90	
	Prob> t	<.0001*	<.0001*	<.0001*	

Further, it can be seen from the table that for down market, coefficient of $R^2_{m,t}$ is positive and significant at five percent level of

significance. From the available results, it can be stated that there is no herding in five-year data set for overall data, up market condition and down

Table 4 :Results of Regression Models for CSSD and CSAD

Data Sets	Presence of herding using CSSD model	Presence of herding using CSAD model
Five year data set	no	no
2015-16 data set	no	no
2016-17 data set	no	no
2017-18 data set	no	no
2018-19 data set	no	no
2019-20 data set	no	Presence of herding in the down market condition.

Summary of the results for the complete five year data set and single year data set is presented in table 4. There is an evidence of significant herd behaviour by using CSAD model in the food processing stocks toward the

market consensus in the year 2019-20 under down market condition, but not during the whole sample period. These results indicate that investors tend to suppress their own beliefs and investment decisions in favour of the market

consensus and are in line with the behavioural finance framework. In contrast, the results do not provide evidence for herding during the whole sample period except 2019-20 down market condition.

5. Conclusion

To measure herding intensity in the market, this study uses the models developed by Christie & Huang (1995) and Chang et al. (2000), where the relationship between market returns and return dispersions is used to detect herding. Return dispersions are measured by the cross-sectional standard deviation, as proposed by Christie & Huang (1995). The regression model proposed by Chang et al. (2000) is used to estimate the herding coefficients. A modified regression model that corrects for multi-collinearity is used to perform the tests. The study results revealed the existence of herding behaviour by using CSAD model in the food processing stocks toward the market consensus in 2019-20 down market condition, but not during the whole sample period. The finding was consistent with many other studies which found evidence for herding behaviour in developing markets in similar market conditions such as in the stock markets of South Korea and Taiwan (Chang et al. 2000), in the Chinese market (Chen et al., 2017), in Europe (Hwang & Salmon, 2001), in Malaysia (Kassim, 2008), China and India (Lao & Sing, 2011), in Taiwan market (Demirer et al, 2010), in developing markets (Degirmen et

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