Herding Behaviour and Liquidity of Stocks in India

N. Chitra Devi

Assistant Professor (Selection Grade) Hindustan Institute of Technology and Science Chennai, Padur

Abstract

This research analyses the herding behavior of different sets of portfolio such as high liquid stock portfolio and low liquid stock portfolio formed on the basis of liquidity measure. This research found that herding behavior differs across the level of liquidity of stocks across different sub sample periods. The presence of herding behavior is analyzed using the daily data of the companies listed in the Bombay Stock exchange from April 2006 to March 2018. This paper denotes that herding behavior is negative in the high liquid stock portfolio and the presence of herding behavior in less liquid stock portfolio in contrast to the findings of Galariotis, Krokida, & Spyrou (2016). This paper also illustrates that herding is significant during the crisis periods and upward trend of the market.

Key words

Herding Behaviour, Liquidity, Stock portfolio, Asymmetric Herding Behaviour

Introduction

The financial paroxysm such as Mexican Crisis (1994), the Asian Financial crisis (1997), Brazilian crisis (1999) and the US subprime crisis (2007) have clearly challenged the validity of EMH theory, which proves that asset prices may substantially deviate from the fundamental values for prolonged periods. The abnormality in the stock price movement spun the focus of researcher to scrutinize the intrinsic dynamic forces of speculative market and analyze the host of anomalies that explains the puzzle of basic asset pricing models in a stock market. There are a series of reasons that apprehend the phenomenon of speculative market are herding behavior, liquidity, asymmetric information and other frictions in a stock market. A welldocumented behavior that encounters the fundamental theories and cause extreme market conditions is herding behavior. Kindleberger (1996) and Galbraith (1993) believe that evidence of bubbles and crashes are due to the mass errors caused by the fickle natures of herd formation.

Herding, a form of correlated behavior where investors follows the same direction of trading, imitating each other and base their decisions based on the consensus ((Nofsinger & Sias, 1999) from a regulatory

perspective, correlated patterns of trades may well undermine financial stability (Demirer, Kutan, & Chen, 2010). Herd formation causes prices to deviate from fundamental value, aggravate volatility of returns, destabilize financial markets, may exacerbate the crises and eventually increases the fragility of the financial system. These associated behavioral effects on stock price movements may affect their risk and return characteristics and thus have implications for asset pricing models (Chiang, Li, & Tan, 2010). The existence of herding behavior in speculative market may be broadly classified into two different strands, rational and irrational. The former reflects the market information and securities true value (Malkiel & Fama, 1970). The later pertains to investor's psychology, where investor investors do not derive share prices rationally rather by following the actions of others blindly by ignoring rational analysis.

The empirical research have mainly focused on the US and Asian markets. No evidence of herding in the US stock market is found by Christie and Huang (1995). This is consistent with the results presented by Chang et al (2000). However, Galariotis et al., (2016) found significance evidence of herding when they conditioned with the liquidity of stocks in four developed stock markets. Moreover, liquid markets offer a favorable environment for trading activity; liquidity can result in concentrated trading ((Admati & Pfleiderer, 1988). Liquidity is one of the imperative characteristic of financial market and important for investment plans and attracted a lot of attention from traders, policy makers and academicians (Brennan, Chordia, Subrahmanyam, & Tong, 2012). The emerging stock markets are often manifested for lower levels of liquidity but exhibits higher level of herding activity. This study is a pioneering work to identify the relationship between liquidity and herding behavior in emerging stock markets such as India across different set of time periods.

Review of Literature

The existing literature on herding behavior is quite inconclusive. There is a growing debate in the literature that the presence of herding is information based or noninformation based in the stock market. It is not easy to define precisely the presence of herding behaviour is due to information based or non-information based in stock markets. Devenow & Welch (1996) documented that herding is information based and market participants adopt the same response to similar information about company characteristics and fundamentals. Literature also supports that herding behavior is irrational and non-information based in different equity markets. For example, herding behavior in the stock market is irrational and it appears due to information asymmetries (Admati & Pfleiderer, 1988). In addition, Hirshleifer, Subrahmanyam, & Titman (1994) produced evidence in support of non-information-based behaviour of investors by mimicking the earlier trades in the stock market in the stock market. Devenow & Welch. (1996) supports that investors follow the leader blindly and forgo the rational analysis. In the line of this, Caparrelli, D'Arcangelis, & Cassuto (2004) have found significant intentional or irrational herding in large companies in the Italian stock market by disagreeing with the validity of EMH theory. However, individual investors are less informed and behave irrationally in the market because they are inferior in obtaining any private information (Kaniel, Saar, & Titman, 2008). Individual investors' inferior position in getting private information from a company may cause irrational herding behavior in the stock market. But information-based herding facilitates to predict the future stock market returns precisely and prove the validity of EMH theory.

In addition rational herding behavior is the outcome of the promotion of informal learning and cascades from agents keeping information (Bikhchandani and Sharma 2000). Previous literature has proved that herding behavior is rational and information based in the stock market. For example, Lao & Singh (2011) analyzed herding behavior in China and India and produced evidence that herding depends upon the market conditions. In support of EMH theory, Lin, Jang, & Tsang (2013) examined whether herding is information based herding and noninformation-based herding and concluded that institutional herding is rational and information based. In addition, Nofsinger & Sias (1999) analyzed the pattern of herding behavior and reported that institutional investors exhibit rational herding behavior in the market because they use positive feedback trading system. However, the presence of herding in all the markets is inconclusive. For Instance, Galariotis et al., (2016) found no herding behavior in developed stock market however, the developed stock market exhibits herding when conditioned with the liquidity of stocks. However, emerging stock market is often characterized as illiquid with high level of herding. Therefore, this research bridge the research gap of finding the relationship between stock market returns and liquidity of stocks. This research is a pioneering work in analyzing the level of herding in different levels of stock portfolio formed on the basis of liquidity.

Data and Methodology

The data set used in the study is composed of 150 securities that have been traded and listed since April 2006 in the Bombay Stock Exchange (BSE) in India. Daily closing price of each security is collected directly from the website of Bombay Stock Exchange from April 2006 to March 2017 consisting of 2720 observations. The sample period consists of three sub-periods. Period 1 measures the before the subprime crisis that consists of April 2006 to May 2007, Period 2 denotes the crisis period and it starts from June 2007 to December 2008 and Period 3 indicates the after-crisis period that consists of December 2008 to March 2017.

Measuring Herding Behaviour

Christie and Huang (1995) argued that the dispersion between individual stock market returns and market portfolio returns will be widespread because investors suppress their own belief and information in favor of the market consensus during the extreme market movements. Chang et.al (2000) proposed a new and powerful measure of Cross-Sectional Absolute Deviation (CSAD) to detect herding behavior in markets as follows:

$$CSAD = \frac{\sum_{i=1}^{N} |r_{i,t} - r_{m,t}|}{N}$$
(1)

Cross- Sectional Absolute Deviation is the measure of average absolute return of the difference between individual security return and aggregate market portfolio return. In the equation (1), $|r_{i,t} - r_{m,t}|$ is the absolute difference between individual security return and aggregate market portfolio return, N is the number of Individual securities.

$$CSAD_t = \alpha + \beta 1 |r_{m,t}| + \beta 2r_{m,t}^2 + e_t$$
 (2)

The CSAD is regressed with the absolute value of average market portfolio return $r_{m,t}$ and the squared value of aggregate market portfolio return $r_{m,t}^2$. $\beta 1$ is the coefficient of absolute value of average Market portfolio return and $\beta 2$ is the coefficient of the squared value of aggregate market portfolio return. Tan et.al (2008) documented that the nexus between the individual security return and market portfolio return is positive and linear because investors exhibit different reactions to the market return. In contrast, when absolute market return increases, the individual security return increases at decreasing rate or decrease with the presence of herding. Thus, the validity of the Efficient Market Hypothesis will be violated. It indicates the presence of a non-linear relationship. Chang et.al (2000) developed a non-linear model to detect the herding behaviour in extreme situations using the assumptions as follows:

$$CSAD_{t} = \alpha + \phi_{1}^{up} |r_{m,t}^{up}| + \phi_{2}^{up} (r_{m,t}^{up})^{2} + e_{t} \quad (3)$$

$$CSAD_{t} = \alpha + \phi_{1}^{down} |r_{m,t}^{down}| + \phi_{2}^{down} (r_{m,t}^{down})^{2} + e_{t} \quad (4)$$

But Chang et.al (2000) argued that the linear relationship between individual stock market return and the aggregate market portfolio return will no longer hold and the relationship may be non-linear if herding occurs during extreme market movements. The presence of herding in each portfolio is analyzed with the following regression equations.

$$CSADPnt = \frac{\sum_{i=1}^{N} |r_{i,t} - r_{m,t}|}{N}$$
(6)
$$CSADP_{nt} = \alpha + \beta 1 |r_{m,t}| + \beta 2r_{m,t}^{2} + e_{t}$$
(7)

To analyze asymmetric effects of herding behaviour in each portfolio, this research uses the following equations.

$$CSADPn_{t} = \alpha + \emptyset_{1}^{bull} |r_{m,t}^{bull}| + \emptyset_{2}^{bull} (r_{m,t}^{bull})^{2} + e_{t} \quad (8)$$

$$CSADPn_{t} = \alpha + \emptyset_{1}^{bear} |r_{m,t}^{bear}| + \emptyset_{2}^{bear} (r_{m,t}^{bear})^{2} + e_{t} \quad (9)$$

CSADPn denotes the herding measure of each portfolio, \emptyset_1^{bull} is the coefficient of absolute aggregate market portfolio returns when market return is more than 0, \emptyset_2^{bull} measures the coefficient of squared market returns at time t. The equation for the down market is similar to the up market. The data is segregated as bullish phase, bearish phase and normal phase. When the rmt > 1 if the market return lies in the upper tail of the return distribution at 5 percent significance level and zero otherwise. Similarly, DUt=1 if the market return lies in the upper tail of the return distribution at 5 percent significance level and zero otherwise. where, D is the dummy variable and takes the value 1 or 0 at time t. DLt =1 if the return lies in the lower tail of the return distribution at 5 percent significance level and zero otherwise. Similarly, DUt=1 if the market return lies in the upper tail of the return distribution at 5 percent significance level and zero otherwise. Similarly, DUt=1 if the market return lies in the upper tail of the return distribution at 5 percent significance level and zero otherwise.

When the daily stock market return $r_{m,t} > 0$ is considered as bullish trend and $r_{m,t} < 0$ is considered as bearish trend for the application of OLS regression model to analyze the asymmetric effects of herding behavior in the Indian stock market.

Presence of ARCH (Auto Regressive Conditional Heteroskedasticity)

Application of ordinary least squares regression model is not considered as BLUE (Best Linear Unbiased Estimator) due to the existence of conditional heteroskedasticity and autocorrelation (Chitra devi & Chandra Mohan (2016). In this study ARCH-LM test has been applied to find out whether residuals of each regression model suffer from the problem of heteroskedasticity with the following equations.

$$\varepsilon_t^2 = \alpha + \sum_{i=1}^n \alpha_i \, \varepsilon_{t-i}^2 \qquad (10)$$

 ε_t^2 is the squared error at lag t, α is the constant, α_i is the co-efficient of lagged error. Moreover, Durbin Watson test statistic of each regression model is used to find out whether the model is free from the problem of autocorrelation.

3.2 Measuring Liquidity of stocks

Amihud and Mendelson (1991) suggested that there were four distinct components: the bid–ask spread, market-impact costs, delay and search costs, and direct transaction costs. All these costs should rise with a decrease in liquidity. Liquidity is a key attribute that affects the asset pricing because investors prefer to invest in liquid stock that can easily be converted into cash. In this study, we have taken Bid – Ask Spread to calculate the liquidity of stocks and stocks are grouped as high liquid stocks and less liquid stocks based on the parameter of Bid-Ask spread values.

4.2 Results and Analysis

4. 1 Herding behavior in the High Liquid stocks Portfolio- Group 1

To identify whether herding differs across various levels of a portfolio classified on the basis of liquidity, stock returns that exhibit one to 0.50 are grouped as a high liquid stock portfolio. Number of securities that shows less than 0.50 and falls under the high liquid portfolio is 70 securities out of securities 150. The results of a high beta stock portfolio present in table 3 for all the sample periods.

	α	β1	β2	Adj. R-Squared
FSP	0.016771*** (43.40534)	0.545125*** (16.96331)	2.692453*** (5.884631)	0.383909
BCP	0.024567*** (99.51542)	• 0.488183*** (2.993238)	8.072953*** (3.7436)	0.521885
СР	0.025739*** (16.41379)	0.263125*** (2.681439)	4.457153*** (4.059065)	0.399084
ACP	0.026227*** (38.71047)	0.560647*** (15.2876)	2.241119*** (4.199983)	0.330998

Table 1Level of Herding in the high liquid stock Portfolio

*** indicates five percent level of significance

** indicates 10 percent level of significance

The results show that $\beta 1$ and $\beta 2$ coefficients are positive and significant for the four periods. It is an interesting fact highly liquid stock portfolio does not exhibit any herding activity in the Indian stock market in all the sample periods. The crisis period 2007-2008 do not exhibit any evidence of herding in the high liquid stock portfolio. The absence of herding in high liquid stock portfolio validates the theory of Efficient Market Hypothesis (EMH) that all the investors investing in the stocks with high liquid stock are well informed and less likely to herd in an efficient stock market.

4.2 Herding behavior in the less liquid Stocks- Group 2

The less liquid stock portfolio is formed on the basis of the average value of the liquidity measure of bid ask spread that shows an average value of less than 0.5. Numbers of securities that show less than 0.5 are 80 financial securities out of 150 securities.

Level of Herding in the less liquid stock Portfolio					
	α	β1	β2	Adj. R-Squared	
FSP	0.01369*** (99.57964)	0.338685*** (14.13393)	6.696394*** (12.51954)	0.436972	
BCP	0.013623***	0.422068***	-1.20466	0.45638	
	(33.16519)	(6.968744)	(-0.90533)		
СР	0.015318***	0.451488***	-1.14611	0.361903	
	(35.89977)	(8.166072)	(-1.01644)		
ACP	0.013191*** (99.51542)	0.322084*** (12.46316)	16.14392*** (27.35461)	0.596398	

Table 2 Level of Herding in the less liquid stock Portfolio

*** indicates five percent level of significance

** indicates 10 percent level of significance

The table 2 reports that β 2 co-efficient is negative and insignificant in the crisis and before the crisis period. As expected, the lower incidence of herding in before crisis and crisis period indicates investors in less liquid securities blindly exhibit distinct behavior during the extreme conditions. The absence of herding in the full sample period after crisis period is an indication that retail investors base their decision using their own information after learning the lesson of herding from the crisis period.

4.5 Asymmetric herding Behavior

This research also analyses the asymmetric reaction of each portfolio to know the distinct investors' behaviour in the bull and bear market. Tversky, A., & Kahneman, D. (1986) documented that investors tend to react more to the potential loss than the potential profit. It denotes that investor reaction to the bear market has larger effects than the effects of bull market. The table 6 represents the asymmetric reaction of different sets of portfolios in the bull and bear market conditions. Hence, the group 1 consists of the high liquid stock portfolio, group 3 holds less liquid stock portfolio of asymmetric effects of herding behavior in the bull and the bear market phases.

Types of securities	Market Trend	α	β1	β2	Adj. R- Squared
High Liquid Stocks	Bull Market	0.0002 (0.044278)	0.98528** (2434.141)	0.00002 (-0.02808)	0.842
	Bear Market	-0.00032*** (-1.35965)	0.988226 (242.851)	-0.00951*** (-0.65267)	0.835
Less Liquid Stock	Bull Market	-0.00098*** (-1.28238)	0.9857 (2004.246)	-0.00011** (-1.56985)	0.824
Stock	Bear Market	0.00021 (0.13563)	0.981311** (429.227)	0.01616 (2.2744)	0.869
Full Sample	Bull Market	-0.00163*** (-21.3775)	0.986522	-0.00024***	0.992
	Bear Market	-0.0002** (-0.35117)	0.98416 (820.528)	0.00557 (1.14377)	0.945

Table 3				
Asymmetric herding	g behaviour			

*** indicates five percent level of significance

** indicates 10 percent level of significance

In the emerging stock market, herding activity is always expected to be higher during the bear market than the bull market phases due to poor and irregularity information disclosures to retail investors. As expected, the asymmetric effects in the high beta portfolio show that the $\beta 1$ and $\beta 2$ coefficients are positive implying that there is no herding acitivity in bull market. However, the $\beta 2$ coefficients are significant and negative and it indicates the presence of herding behavior in the bear phase of the market. It shows that investors investing in high liquid stock portfolio are well informed and base their decisions based on the information

available to them rather than following the consensus blindly (Ray 2009). It displays the absence of herding and the results are consistent with the findings that asymmetric reaction is absent in the emerging stock market (Chang et.al, 2006).

The table 3 reports absence of herding in both phases of bull and bear market as that $\beta 1$ and $\beta 2$ coefficients are positive and significant. It shows that there is no asymmetric reaction in the less stock liquid portfolio, and the result may be the fact that investors in the less liquid beta portfolio do not exhibit any herding behavior as they believe with their own information sources.

Table 4 Comparisons of herding behavior across different sets of portfolios BCP FSP CP ACP 0.016227*** High 0.017871*** 0.023667*** 0.026739*** α Liquid (37.71047)(42.40534)(99.51542)(17.41379)Stocks 0.548125*** 0.388183*** 0.253125*** 0.560647*** ß1 (15.96331)(2.793238)(2.581439)(15.2876)B₂ 2.692453*** 8.072953*** 4.457153*** 2.241119*** (5.884631)(3.7436)(4.059065)(4.199983)0.320998 Adj.R^2 0.373909 0.501885 0.369084 0.013561*** 0.016185*** 0.016748*** 0.012983*** Less Liquid α (92.59168)(34.7997)(32.34415)Stocks (98.12136) 0.334974*** 0.166912*** 0.329223*** 0.267328*** β1 (18.94994)(2.741621)(6.277272)(20.88764)B₂ -0.6305*** 1.093864 -0.07572-0.73779(0.958716)(-0.11967)(-2.23742)(-2.25602)Adj.R^2 0.319179 0.245332 0.329654 0.267824

4.6 Comparison of herding behavior among the portfolios

*** indicates five percent level of significance

** indicates 10 percent level of significance

To compare and analyze whether herding differs in a different level of liquidity based portfolios, this research employs CSAD values for each portfolio and then run regression model for the four periods such as Full Sample Period, Before Crisis Period, Crisis Period and After Crisis Periods. The table 4 presents the results of herding behavior of different sets of portfolios. The results of High liquid stock portfolio shows that $, \beta_1, \beta_2$ coefficients are statistically significant and positive for all the cases according to five percent criterion levels in Full Sample Periods, Crisis Period, Before Crisis Period and After Crisis Period. The group 2 of less liquid stock portfolio β_2 coefficients is statistically negative in before crisis and crisis period which implies the existence of herding with low volatile stocks. In addition, the existence of herding behavior in less liquid stocks provides supplementary evidence that herding behavior differs in stock portfolios with liquidity of stocks. The significant difference between the Group 1 and Group 2 provide supplementary evidence that herding differs in stock portfolios based on the level of liquidity of stocks. These results support that investment behavior varies with different level of liquidity of stock portfolios.

Conclusion

This paper provides new evidence of herding behavior in the different levels of liquidity. Herding is one of the short lived phenomena that shows the herding differs based on the level of liquidity. Highly liquid stocks do not exhibit any herding behavior while the less liquid stocks exhibits herding behavior in the Indian market. In this study, CSAD measure is used to detect herding behavior in the stock listed in the Bombay Stock Exchange for different sample periods such as before crisis period, crisis period and after crisis period. The results show that the Indian stock market exhibits significant incidence of herding behavior in all the sample periods. Besides, this research identifies and analyses how herding behavior differs across various levels of liquidity portfolio such as high liquid stocks and less liquid stocks. However, found significance evidence of herding when they conditioned with the liquidity of stocks in four developed stock markets. In contrast with the study this research concludes that herding behavior does not have any kind of relationship with the liquidity of stocks.

This research suggests that a lower level of volatility exhibits a higher level of herding. The study also finds the pattern of herding behavior when stock market price follows either bearish or bullish trend. Consistent with the results of Lao and Singh (2010), the Indian investors inclined to herd during the upward trend of the market. These results support that investment behavior varies with different level of liquidity of stocks. This research sheds lights on the investors to use as a guide for constructing a diversified portfolio with the understanding of herding activity in different sets of portfolios in the emerging stock market.

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