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An Examination of Herd Behavior: An Empirical Study on Indian Equity Market

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Abstract. The paper aims to study the herding effect in Indian equity market. The authors have tested the presence of herding using data from National Stock Exchange (NSE) and methodology as described in Christie and Huang (1995) and Chang, Cheng and Khorana (2000). Security return dispersion as a function of aggregate market return has been taken as a proxy for herd behavior. To test the presence of herding linear regression model and linear regression using quadratic functional form has been applied. Previous studies have reported the presence of herding in emerging Asian economies. However no evidence has been found in developed economies. The result of the study endorses the fact that Indian markets are efficient as no severe herding has been reported. However when presence of herding was tested for periods of market stress, it prevailed in bull phase.

Keywords: Herding, Security Return Dispersion, Market Efficiency.

1. Introduction

Investment behavior has been an area of interest for portfolio managers, brokers, investors as well as academic researchers. History reveals that irrationalities in investment behavior have been the reason behind major booms and busts in the market. Herding is one such behavioral anomaly which defies the efficient market hypothesis (EMH). According to EMH, investors make informed decisions and determine their expected returns based on equilibrium model like Capital Asset Pricing Model (CAPM). Therefore all the securities are fairly priced. However in case of herding, investors mimic the actions of crowd. They do not make decisions based on their own judgment which leads to mispricing of securities. It leads to an inefficient market situation characterised by speculative bubbles. Herding is particularly seen in periods of market extremes [Christie and Huang (1995)]. This could be due to two reasons one of which is social pressure and another is the common logic that crowd cannot be wrong and knows better than individual investors. When EMH gets violated, herding can be intentional. While it is spurious when EMH does not get violated (Hwang and Salmon [2001]).

Since India is an open economy, it is sensitive to foreign market movements and actions of Foreign Institutional Investors (FII's). Corporate governance has led to a greater transparency of information disclosure by firms. Thus the investors are better informed and are expected to make rational decisions. Still many instances of irrational behavior have been observed. The most recent example being the stock market crash of year 2008; one of the biggest in Indian stock market history. These irrationalities can be attributed to various heuristic driven and frame dependent biases. Previous studies have reported behavioral biases like loss aversion, overconfidence, optimism, and herding as important reasons behind market anomalies. Herding has been documented as one of the dominant bias prevailing in emerging Asian economies such as South Korea and Taiwan. This is due to the fact that these markets are considered riskier and less mature

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than those of developed nations. Very few researchers have tried to find the presence of herding behavior in Indian context. Therefore the present study focuses on examining the herding behavior in Indian equity market

2. Literature Review

From the past literature it can be seen that several studies have been done to study the herd behavior in stock markets.

Christie and Huang (1995) gave a test to identify herding behavior in the market. They used cross sectional standard deviation (CSSD) as a measure of average proximity of individual asset returns to the realized market average. They analysed that market alternates between normal and extreme phases and that herding exists in periods of market extremes. They argued that when investors follow aggregate market movement, disregarding their own judgment (herding) then individual asset returns will not diverge much from overall market return. Therefore value of CSSD gets reduced. Olsen (1996) analysed the implications of herding behavior on earnings forecasts. Herding results in a reduction in dispersion and an increase in the mean of the distribution of expert forecasts creating a positive bias in earnings estimates.

Chang et al. (2000) extended the work of Christie and Huang and established a non linear relationship between level of equity return dispersions and the overall market return. Cross-sectional absolute deviations (CSAD) were taken as a measure for dispersion. They examined the presence of herding in 5 financial markets including both developing and developed. These were US, Hong Kong, Japan, South Korea, and Taiwan. The found that herding was not present in developed economies (such as US & Hong Kong) but present in emerging economies (such as South Korea and Taiwan).

Hwang and Salmon (2001) developed a measure to test herding in US, UK, and South Korean stock markets. They evaluated the direction towards which the market may be herding. Their measure took into account the fundamentals of the firms and influence of time series volatility. With this they could differentiate intentional herding from spurious herding. Contrary to Christie and Huang (1995) they found herding in normal market conditions rather than market stress.

Caparrelli et al. (2004) investigated the presence of herding in Italian stock market. They found nonlinearity in herding pattern using methodology given by Chang et al. They also determined degree of herding (H statistics) to differentiate between spurious and intentional herding. Formula for H-statistics was given by Hwang and Salmon (2001).Intentional herding was indicated by a decreasing H-statistics and was found to be greater in Bull Phases and in small-cap companies of Italian stock market. Lao & Singh (2011) examined herding patterns in Indian and Chinese stock markets. They found that herding behavior is greater during extreme market conditions in both markets but the pattern is different. In Chinese market, herding is greater when market is down (bear phase); however in India herding is greater when market is up (bull phase).

Lakshman et al. (2011) observed that the presence of market wide herding in Indian stock markets is not very severe. They found that FII's do not significantly impact herding, however Mutual Funds increase herding. They also found that Nifty returns have no impact on herding. They documented that herding was on a rising trend from 2003-2005, however post 2006 herding started to decline. They suggested that periods of market crisis can help return markets to equilibrium, and that herding can be more apparent before market stress, rather than during it.

3. Research Objectives:

The objectives of this study are as follows:

- To investigate the presence of herding in conditions of extreme market stress on market as a whole.
- To examine whether herding pattern is nonlinear in nature as suggested by Chang et al. (2000).
- To find the presence of herding in bull and bear phases of the market individually.

4. Methodology and data description

4.1. Data Collection

The study uses a mobile sample of Nifty50 stocks. Nifty 50 is a well diversified 50 stock index accounting for 22 sectors of Indian economy. The data consists of total returns of each constituent stock for a period of 5 years, starting from 1st April, 2006 to 31st March, 2011. The returns were taken on daily basis and downloaded from Centre for Monitoring Indian Economy (CMIE) Prowess database.

4.2. Methodology

4.2.1. Presence of herding on market as a whole:

The paper follows the methodology given by Christie and Huang [1995]. A regression model is run to find out the effect of market stress on individual return dispersion.

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + \varepsilon_t \quad (1)$$

CSSD has been used as a measure of individual return dispersion.

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

Where, $R_{i,t}$ is the return of stock i at time t and $R_{m,t}$ is the cross sectional average return of N stocks of the sample at time t. It was argued that in cases of extreme market stress, investors go with the consensus rather than following their own beliefs so as to seek certainty and conformity. They want to avoid the anxiety of making incorrect decisions under the conditions of uncertainty which comes with market stress and leads to herding. In presence of herding, the investors' decisions would be based solely on market movements, so that the individual asset returns would be similar to overall market returns. Hence the value of CSSD increases at a decreasing rate. In presence of severe herding it may lead to decrease in dispersion.

The dummy variables in regression equation (1) are used as explanatory variables to differentiate the periods of market stress from normal periods, taking into consideration that market stress occurs when aggregate returns lie in upper or lower tail of return distribution. So that, D_t^L=1 if, on day t $R_{m,t}$ lies in lower tail of return distribution and 0 otherwise. D_t^U=1 if, on day t $R_{m,t}$ lies in upper tail of return distribution and 0 otherwise. Upper and lower tails were determined at 66% = (R_m, $\pm\sigma$), 95%= (R_m, $\pm 2\sigma$) and 99%= (R_m, $\pm 3\sigma$) levels. Herding was proven if dummy variable coefficients were negative and statistically significant. Unit root tests were conducted on CSSD series to check if the series was stationary.

4.2.2. Non Linearity of herding pattern:

Non linearity between dispersion and market return was checked using curve estimate measure (Fig.1)

Another test is conducted to examine the existence of non linear relationship between dispersion and market returns. According to Chang et al. [2000] the return dispersions will decrease (or increase) at decreasing rates, in case of moderate to severe herding. They proposed that this relationship should be negative and nonlinear in presence of herding. The measure of dispersion given by Cheng et al is cross sectional absolute deviation (CSAD).

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

They consider a general quadratic equation to test this behavior:

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

Where the presence of a negative and significant γ_2 indicates herd behavior. The stationarity of CSAD series is checked by unit root tests.

4.2.3. Presence of herding in bull and bear phase of market respectively:

Considering that the stock behavior may be asymmetric in up and down market phases, the generalized relationship mentioned above can be bifurcated into following;

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP}|R_{m,t}^{UP}| + \gamma_2^{UP}(R_{m,t}^{UP})^2 + \varepsilon_t \quad (5)$$

$$CSAD_t^{DOWN} = \alpha + \gamma_1^{DOWN}|R_{m,t}^{DOWN}| + \gamma_2^{DOWN}(R_{m,t}^{DOWN})^2 + \varepsilon_t \quad (6)$$

Where $|R_{mt}^{UP}|$ & $|R_{mt}^{DOWN}|$ are the absolute values of the average overall sample return when market is up (or down). Similar to the previous case, here also negative and significant γ_2^{UP} and γ_2^{DOWN} captures herding behavior

5. Result

5.1. Results for the presence of herding and its non linearity with market as a whole

The results of unit root tests show that both CSSD and CSAD series were stationary. The coefficients of D_t^L & D_t^U in equation (1) are both positive and significant at 1% level (Table 1) which shows that CSSD increases with increase in market return. This refutes the hypothesis of herding behavior.

The value of γ_2 in equation (4) is also positive and significant at 1% level, this means that return dispersion are decreasing (or increasing) at an increasing rate (Table 1). This again highlights the fact that herding does not exist in Indian stock market but indicates the presence of non linearity in relationship.

The curve estimates reveal that dispersion is nonlinearly related to market returns (Fig.1).

5.2. Results for bull and bear phase of market

Individual tests for bull and bear phases of market in equation (5) & (6) indicate that, herding prevailed when the market was up (as γ_2^{UP} was negative and significant at 5% confidence interval). However, no evidence of herding has been found when market was down (negative insignificant γ_2^{DOWN}) (Table 2).

6. Conclusion:

It can be concluded that herding is not present in Indian Stock market for the period of 2006 to 2011. The results of this study are in contrast to the findings of Chang et al. where herding was present in emerging economies like South Korea and Taiwan. This depicts that Indian investors are better informed and it seems they behave rationally. The results of the study are consistent with the findings of Lakshman et al. (2011). However individual tests for bull and bear phases of markets show that herding behavior is observed in greater magnitude in bull phase. These results are in alignment with findings of Lao and Singh (2011). One of the reasons for this asymmetry in bull and bear phases could be reinforcement learning, wherein past trade outcomes have an effect on the future outcomes. From this it can be inferred that during bear phase, the market consensus might not have led to positive results for the investors. This could have reinforced their belief that following the crowd is a wrong decision due to which they discontinued to herd. Another interpretation for this asymmetry could be that, investors in bear phase did not panic and engage into herding in order to avoid their losses. The logic that crowd can never be wrong did not hold in the case of bear phase.

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Fig.1 Curve estimate: Relation between CSAD and market returns

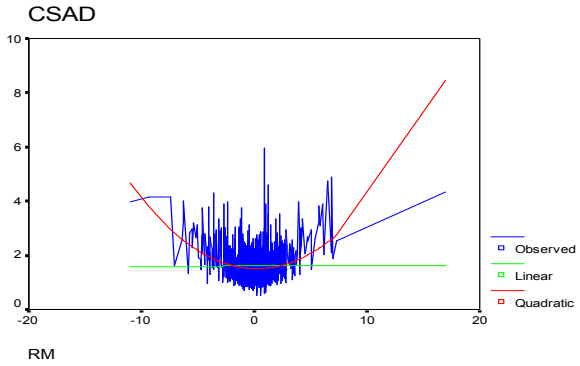

Table 1: Results of Regression of Daily CSSD and CSAD using Dummy Variables

Coefficients				Coefficients			
Model	Unstandardized Coefficients	t-statistic	Sig.	Model	Unstandardized Coefficients	t-statistic	Sig.
	Beta				Beta		
(Constant)	1.923	78.918	0.00	(Constant)	1.507	87.166	0
D1	0.722	11.037	0.00	Rm	-0.01142	-1.38	0.168
D2	0.888	12.317	0.00	Rm square	0.02473	17.189	0
a Dependent Variable: CSSD				a Dependent Variable: CSAD			

Table 2: Results of regression of daily CSAD during periods of market stress

Coefficients (Bull Phase)				Coefficients (Bear Phase)			
Model	Unstandardized Coefficients	t-statistic	Sig.	Model	Unstandardized Coefficients	t-statistic	Sig.
	Beta				Beta		
(Constant)	0.861	3.998	0.00	(Constant)	1.144	4.069	0.00
Rm	0.424	5.372	0.00	Rm	0.277	2.146	0.033
Rm square	-0.01271	-2.47	0.015	Rm square	-0.0004456	-0.035	0.972
a Dependent Variable: CSAD up				a Dependent Variable: CSAD down			