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A study on Factors Influencing the Herding Behavior of Indian Stock Market

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Abstract - Behavioral finance proposes that cognitive traits of investors impact their investment decisions which are not always rational, in contradiction to traditional finance. These cognitive traits of stock investors are influenced by their demographical profile and the financial information that they receive from various sources which in turn influences their stock investment decisions. Investors with similar demographic profile tend to follow a similar pattern with regard to their investment behavior biases. The main objective is to study the Factors Influencing the Herding Behavior of Indian Stock Market. Using the state space model, calculate the herding measure using the log cross-sectional standard deviation of beta of the market component (using the kalman filter approach).

Keywords - Herding behavior, Indian stock market, Factors

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INTRODUCTION

During the previous several decades, the Indian stock market's expansion and potential attracted a large number of investors. In the stock market, investors exhibit herding behaviour and often attempt to imitate others' actions or conclusions. The majority of empirical studies on herding behaviour in emerging stock markets found that it exists at least in distinct states of the market. Identifying the factors of herding behaviour will assist in explaining a variety of behavioural concerns that occur among investors, and the study will provide further clarity and throw light on the peculiarities of herding behaviour in Indian stock markets. There is enough data in the literature to suggest that a variety of variables impact the herding behaviour of investors. The goal of this chapter is to identify and show the many elements that govern herding behaviour in the Indian stock market across the research period. It also discusses how investors digest available data and make their investment choices appropriately, as well as how to recognise the market's unstable factors. This research considers the involvement of both business fundamentals and market conditions as the regulating source of herding behaviour in the Indian stock market, which is a developing market (1).

A number of empirical investigations have shown the presence of a link between herding behaviour and other parameters. Only a few research have looked at how macroeconomic conditions in the stock market influence herding behaviour. Furthermore, as compared to big organisations, small enterprises are less transparent due to their restricted information availability. However, the research on herding behaviour has inconsistent results on the size component, with herding toward both small and big stocks being seen. In addition, when comparing industrialised and developing nations, it is discovered that the variables influencing herd behaviour vary. It's also worth noting that the outcomes in the emerging market vary from one another. An in-depth examination of herding behaviour in the Indian stock market can benefit investors and practitioners in a variety of ways, including a better understanding of the destabilising implications of these elements in the markets and further insight into the driving drivers of herd behaviour. By evaluating numerous variables discussed in the following section, it is necessary to conduct an analysis utilising various criteria in order to determine the causes of herding behaviour in the Indian stock market and hence the origins of herding (2).

PROCEDURE FOR ANALYSIS

The research used the following approach to determine the impact of different variables on herding behaviour.

- Using the state space model, calculate the herding measure using the log cross-sectional standard deviation of beta of the market component (using the kalman filter approach).
- Collect the variables that will be studied.

- Calculate the monthly return of the BSE – SENSEX and S&P 500 indices by subtracting the initial difference between the log values of the two series.
- Calculate the monthly market volatility using Schwert's (1989) technique.
- Transform the series into a log format.
- To normalise the data, divide net institutional investment, net foreign institutional investment, and net domestic institutional investment by the BSE market capitalization.
- Convert the information (volume) to a log format.
- Preliminary analysis should be done using descriptive statistics and a line graph.
- ADF and PP tests may be used to determine the stationarity of the variables independently.
- Find the controlling influence of the specified variable on the herding measure using the state space model.
- (both individually and collectively)
- To test for robustness, regress the retrieved herding measure against a set of covariates.

ANALYSIS OF DETERMINANTS OF HERDING BEHAVIOUR

Summary Statistics and Stationarity Tests

The summary statistics of the numerous variables employed in this investigation are explained in Table 1. In the Indian stock market, the mean value and standard deviation of cross sectional standard deviation of beta on market factor are both positive. It also shows the data's apex (3).

Table 1: Summary Statistics and Results of Stationarity Tests for Different Variables

Description	Variables Used										
	Market Beta (FF Model) (Log)	Market Return	Market Volatility (Log)	Market Volume (Log)	US Index Return (S&P-500)	Net Investment (Normalized)			Size Factor (SMB)	Value Factor (HML)	Time varying Herding Measure
						FIIs	MFIs	IIs			
Mean	-2.581881	1.339 43954	1.741 86162	9.927 22	0.002 102174	0.000 12929	0.005 8994	0.123 4214	0.005 3552	-0.036 111	-0.016 0555
Median	-2.587 73	1.509 6222	1.638 8535	9.870 22	0.001 0274	0.000 10404	-0.000 4	0.009 9483	-0.001 218	-0.035 559	0.028 217
Std. Dev.	0.534 91313	7.701 8185	0.451 3131	0.405 7	0.046 462	0.000 49393	0.005 6721	0.187 9009	0.203 3717	0.200 9958	0.209 5078
Skewness	-0.035 02	-0.550 32	0.797 5959	0.559 3	-0.886 1	-0.209 31	1.376 1775	0.417 0881	0.548 6693	-0.028 23	-0.639 65
Kurtosis	2.961 07979	4.403 67878	3.279 32323	2.968 4	4.777 5883	5.581 5222	6.617 8669	3.671 0111	4.832 5221	4.303 9098	3.236 0053
Jarque-Bera	0.032 10	15.90 87*	13.11 21*	6.262 4**	31.50 26*	34.19 74*	103.3 221*	5.730 4***	22.81 19*	8.518 0**	8.461 6**
Observations	120	120	120	120	120	120	120	120	120	120	120
ADF	-9.256 7*	-9.687 0*	-5.755 0*	-2.999 7**	-8.703 2*	-3.232 3**	-8.268 4*	-6.742 6*	-9.384 5*	-3.785 1*	-6.508 8*
PP	-9.292 2*	-9.761 6*	-9.384 5*	-3.015 7**	-8.790 9*	-3.232 3**	-8.300 3*	-7.131 2*	-9.316 5*	-10.36 76*	-6.508 8*

Note: * denotes significance at 1%level and **, *** denotes significance at 5% and 10% respectively. Net foreign institutional investment, net mutual fund

investment, and institutional investments are defined as FII, MFI, and IIS, respectively, and are normalised by dividing by the index's market capitalization. The time intervals for all of the series are monthly. CSSD (cross-sectional standard deviation) is an abbreviation for cross-sectional standard deviation. The state space model was used to obtain a time-varying herding metric (4).

Line Graphs of Variables Included in the Study

Figure 1 shows a quick overview of each variable utilised in the research from April 2002 to March 2012. It aids in the analysis of variable movement over time and data conversion into log form for smoothing. The line graphs vividly depict the differences caused by various market occurrences, particularly the crisis.

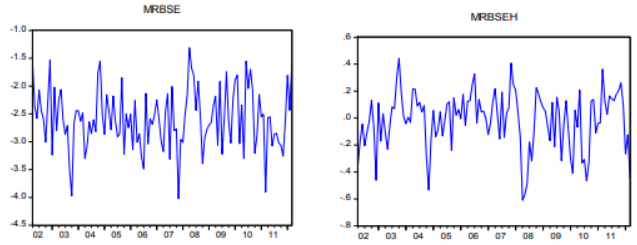

Figure 1 (a): Line Graphs of Different Variables

MRBSEH is the herding series derived using the kalman filter, and MRBSE indicates the log cross sectional standard deviation of beta. The graph demonstrates that the variance is greater in both situations during the 2007-2008 crisis period (07-08 in the graph).

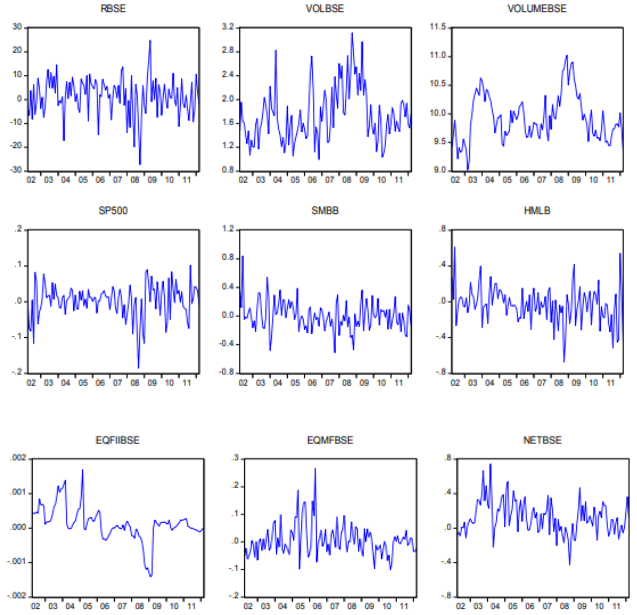

Figure 1 (b): Line Graphs of Different Variables

RBSE is for BSE market return, VOLBSE and VOLUMEBSE stand for log market volatility and log market volume, respectively, and show greater variance during the crisis. The SMB and HML factors discovered by the Fama French factors are represented by SMBB and HMLB. EQFII, EQMFBSE, and NET BSE are the normalised net FII investment, net mutual fund investment, and net institutional investment, respectively. EQFII showed no trend, whereas EQMFI and NETBSE showed a nearly identical pattern, but there is more variation during the 2004-06 period, and the withdrawal of FII during the crisis is more visible from the graph (5).

DETERMINANTS OF HERDING BEHAVIOUR IN INDIAN STOCK MARKET

Herding Behaviour with Market Return, Market Volatility, Market Volume and Return of S&P -500

The researchers looked at the impact of market return, market volatility, and market volume independently, as well as all three components combined as a control variable, on herding behaviour. The coefficients of the monthly return on the BSE (r_{mtBSEt}) are insignificant (model 14) when looking at Table 2, showing that market return is not a sensitive factor for investor herding or that market return variations have no influence on herding (6).

Table 2: Estimations of State Space Model after Controlling Market Volume, Market Return, Market Volatility and Return of S&P500

Estimates	Market Return(14)	Market Volatility(15)	Market Volume(16)	Market Return Volatility & Volume, (17)	Volume, Volatility, Return & S-P500(18)
ϕ_m	0.48891516*** (3.0722)	0.83521301*** (11.1373)	0.437472** (2.49507)	0.727277*** (6.56821)	0.742739*** (7.01883)
μ	-2.58276175*** (41.3335)	-1.6299996*** (-19.6576)	-1.83374*** (30.5852)	-3.61692*** (-52.2695)	-3.6123*** (-51.2076)
σm,n	0.2749923*** (2.67203)	0.1377388* (1.83689)	0.281292 (2.65425)	0.173953** (2.00974)	0.169037** (1.9867)
σm,v	0.4286441*** (5.4790)	0.4454245*** (6.7701)	0.429704*** (5.41674)	0.433354*** (6.45241)	0.434589*** (6.49718)

σm,v	0.4286441*** (5.4790)	0.4454245*** (6.7701)	0.429704*** (5.41674)	0.433354*** (6.45241)	0.434589*** (6.49718)
Log Volume	-	-	-0.074881*** (12.3937)	0.207279*** (29.73775)	0.207713*** (29.22479)
Log Volatility	-	-0.5310682*** (-11.9726)	-	-0.57492*** (-15.2821)	-0.57942*** (-15.1299)
$rmtBSEt$	0.00632154 (1.0180)		-	-0.00273 (-0.46962)	-0.00272 (-0.46872)
SP-500	-	-	-	-	0.18814 (0.19031)
Proportion of Signal	0.5140877	0.2574975	0.525865	0.325198	0.316007
Maximum Likely Hood Values	17.7509	25.0937	17.3916	25.8232	25.8395

The model's findings (15) explain how market volatility affects herding behaviour. The study used log market volatility calculated using the Schwert (1989) methodology, and it can be seen that the estimates of the herding measures $\sigma_{m,n}$ are significant at the 1% level, as is the coefficient of the volatility factor, and the negative sign explains that the log cross sectional dispersion of the beta increases (decreases) as market volatility decreases (increases). Even after adjusting for volatility ϕ_m, the data imply that herding is still a factor. It's also worth noting that the value of ϕ_m dropped from 0.27 to (0.13), and the negative coefficient indicated that $Std_c(\beta^b_{imt})$ drops as market volatility rises.

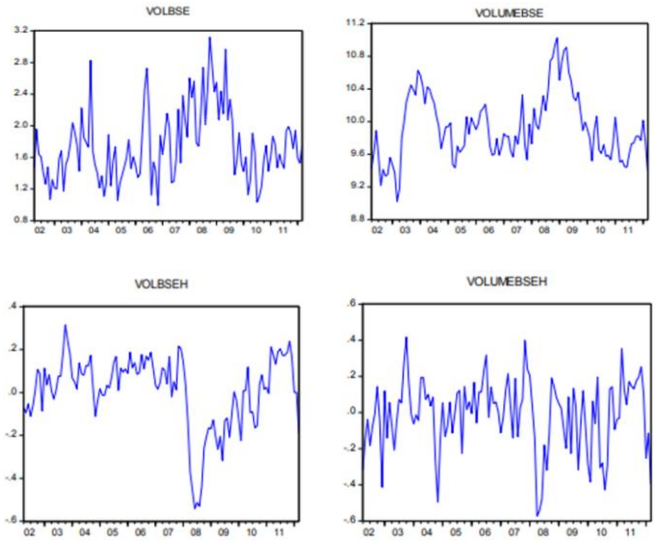

Figure 2: Evolution of Herding Behaviour with Market Volatility and Market Volume

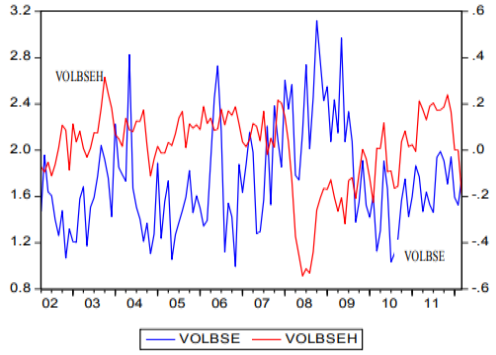

Figure 3: Evolution of Herding Behaviour with Market Volatility

Herding Measure with FII and MFI

The impact of foreign institutional investment, the function of mutual fund investment, and the combined effect of both in promoting herding behaviour in the Indian stock market were also examined. The analysis is done using the net FII flow and net mutual fund flow to the market, and the research employed monthly net investment flows and model (19), (20), (21). (both the factors are normalised by dividing with market capitalization of the index). The effect of net institutional investment was also investigated, and the results of multiple models (19), (20), and (21) are reported in Table 4.3. The table demonstrates that herding occurs in the Indian stock market, since both ϕ_m and $\sigma_{m,n}$ are very significant (at the 1% level), with a signal percentage of approximately 54 percent. The considerable persistence factor, ϕ_m, explains that herding behaviour exists in the analysed markets, and the mutual fund estimate is negative

(insignificant), but it is positive and significant non the case of FII Investment, indicating that FII impacts herding behaviour. When comparing $\sigma_{m,n,}$ ϕ_m and μ, it is obvious that there is little fluctuation in $Std_c(\beta^b_{imt})$ which explains why FII movement has a less impact on herding behaviour in the examined market. Furthermore, the positive coefficient of net FII investment explains why $Std_c(\beta^b_{imt})$ rises with the degree of net FII flow, indicating that herding diminishes as net FII flow rises (7).

As a result, it may be argued that net foreign institutional investment has a negligible impact on herding behaviour. Furthermore, the net flow of institutional investment (NET) is positive and small, implying that net institutional investment has little power on herding behaviour in the market under consideration. As a result, institutional investors do not have a significant influence on herding behaviour in the Indian stock market.

Table 3: Estimations of State Space Model after Controlling Different Institutional Investors

Estimates	FII (20)	MFI (21)	NET (MFI+FII) (22)
ϕ_m	0.457701*** (2.7484)	0.43410311** (2.5070)	0.4467915*** (2.6756)
μ	-2.58193*** (-41.9962)	-2.574814*** (-42.7592)	-2.577532*** (-42.2069)
$\sigma_{m,n}$	0.2850109*** (2.7490)	0.2865274*** (2.7268)	0.2877671*** (2.7699)
$\sigma_{m,v}$	0.42590773*** (5.3536)	0.42677267*** (5.3426)	0.4251709*** (5.3211)
FII_{net}	5.76323*** (6.0514)	-	-
MFI_{net}		-0.2245571 (-0.2561)	-
NET_{ii}	-	-	0.015814 (0.0656)
Proportion of Signal	0.532817	0.537969	0.534792
Maximum Likely Hood Values	17.351	17.3755	17.2590

Note:*** denotes significance at1%level, table shows the estimates of the state space models, $\log[Std_c(\beta^b_{imt})] = \mu_m + H_{mt} + C_{m1}NetFII_t + V_{mt}(20)$, $\log[Std_c(\beta^b_{imt})] = \mu_m + H_{mt} + C_{m2}NetMFI_t + V_{mt}(21)$, $\log[Std_c(\beta^b_{imt})] = \mu_m + H_{mt} + C_{m3}NetII_t + V_{mt}(22)$, $H_{mt} = \Phi_m H_{mt-1} + \eta_{mt}$ The variables are normalized with market capitalization.

Figure 4 depicts the development of herding behaviour as a function of net FII flow into the market under consideration. On the left axis, EQFIIBSE is the net flow (normalised with the index's market capitalization) and on the right axis, FIIBSEH is the extracted herding measure. It is difficult to discern a specific trend or pattern of herding behaviour from the figure, which shows a very low level of herding on average (8-10).

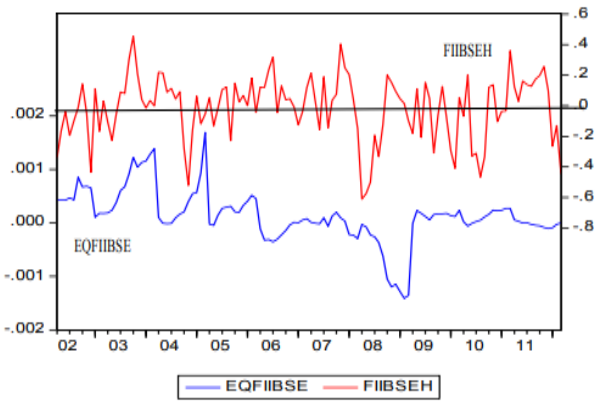

Figure 4: Evolution of Herding Behaviour with Net FII Flow

Herding Measure with Size and Value Factors

The research also included the Fama French factors SMB and HML as explanatory variables in its analysis. The research followed Fama and French's (1993) and (1995) style method, and Table 4 shows how the SMB and HML factors, or size and value factors, explain the link between herding.

The research discovered that none of the parameters produced significant results, indicating that HML and SMB had little influence on herding behaviour in the Indian stock market. The research also looked at the combined impact of SMB and HML based on the size and value component, and

came to the same conclusion, confirming that the factors evaluated had no effect (11-13).

Table 4: Estimations of State Space Model after Controlling Size and Value Factor

Estimates	SMB (23)	HML (24)	SMB,HML (25)
ϕ_m	0.419666** (2.2654)	0.461649*** (2.6110)	0.436862** (2.37084)
μ	-2.57916*** (-44.177)	-2.56359*** (-42.9332)	-2.57231*** (-43.9072)
σm,n	0.172116*** (2.6041)	0.168357** (2.4823)	0.269257 ** (2.50636)
σm,v	0.183373*** (5.4353)	0.18335*** (5.6109)	0.431574*** (5.55216)
SMB	0.378694 (1.605)	-	0.263435 (1.1198)
HML	-	0.346982 (1.4845)	0.166333 (0.71272)
Proportion of Signal	0.321765	0.314736	0.321765
Maximum likely hood values	18.5072	18.3149	18.6364

Note:***,** denotes significance at1%level and 5 % level respectively. Table shows the estimates of the state space models, $\log[Std_c(\beta^b_{imt})] = \mu_m + H_{mt} + C_{m1}SMB_t + V_{mt}(23)$, $\log[Std_c(\beta^b_{imt})] = \mu_m + H_{mt} + C_{m2}HML_t + V_{mt}(24)$, $\log[Std_c(\beta^b_{imt})] = \mu_m + H_{mt} + C_{m1}SMB_t + C_{m2}NHML_t + V_{mt}(25), H_{mt} = \Phi_m H_{mt-1} + \eta_{mt}$ are used..SMB and HML are derived using the Fama French approach.

CONCLUSION

The most prevalent behavioural bias that has an effect on financial markets is herding behaviour. Investors who rely on word-of-mouth for the majority of their financial information are more likely to exhibit herding behaviour than those who rely on any other kind of information. Investors with the same racial or ethnic background tend to behave in a similar way. According to the findings of this research, men exhibit less herding bias than women. Compared to youthful stock investors, older investors showed a greater tendency to follow the herd. Investors' marital status had just a little effect on the perception of herding bias.

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