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Evidence of Herding in the Indian Stock Market Over the Past Two and Half Decade: A Critical Incident Analysis

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Abstract:

Purpose: Herding is the most relevant behavioural biases found among Indian investors. This paper examines the presence of herding in the Indian Stock Market over the past two and half decade years, starting in 1995.

Design/Methodology: In order to analyze the data, The entire data set was divided into three popular events, including the Chinese Stock Market Turbulence, the Subprime Mortgage Crisis, and the Asian Financial Crisis. The model developed by Chang et al. has been used for the analysis. The study explores the nonlinear relationship between market returns and stock prices across post-crisis, crisis, and pre-crisis periods in bull and bear phases using BSE 500 data. It employs a dummy regression model named Cross Section Absolute Deviation (CSAD) for analysis.

Findings: No herding bias was detected during the Chinese Stock Market Turbulence, the Subprime Mortgage Crisis, and the Asian Financial Crisis in the pre-crisis, crisis, and post-crisis periods.

Implications: Investors will be aware of their suboptimal investment choices and potential losses. Evidence of herding will prevent the market from possible bubble burst.

Keywords: Behavioural Finance, Herding, the Asian Financial Crisis, Sub-Prime Mortgage Crisis, Chinese Stock Market Turbulence

Introduction

Understanding the practice which market participants follow while make judgments in the capital market is a complex issue in financial literature. (A.V.Banerjee, 1992) Last few decades years have witnessed a shift in financial research, incorporating behavioral finance adding the cognitive element to the challenging traditional financial theories as they were incapable to explain anomalies in the capital market (Barberis, 1998). One key assumption is that investors are always rational. One among the relevant behavioral bias observed in financial markets is the herding bias, where investors collectively follow the behavior of others or mimic the market's actions. (Bikhchandani, 2000) The reasons causing this behavior can differ. Herding behaviour is believed in many domains of research, including psychology, sociology, economics, and finance. Herding behaviour is characterised as a group of individuals copying the activities of a spokesperson. Investors may suffer economic penalties if they abandon individual thought and adopt collective behaviour. (Bikhchandani S. H., 1992) In recent decades, academics, scholars, investors, and relevant regulatory organisations have focused their efforts on predicting and characterising stock market movements. Two opposing viewpoints on the fundamental mechanics of capital market behaviour have developed throughout time. Fama (1965), Jensen (1967), Sharpe (1964), and Fama (1970), produced the initial viewpoint, the famous efficient market hypothesis. This viewpoint assumes that markets operate effectively and financiers act rationally, implying that the stock price reflects all accessible data in the stock market. Markets may be classified as strong, semi-strong, or weak depending on the quantity of information available. The efficient market theory suggests that stock prices mostly don't change, though occasional fluctuations can occur by chance. However, evidence has challenged this theory and suggested that stock price changes play a more vital role in financial crises. (Christie, 1995) This led to the rise of behavioral finance, which explores factors like investor behavior, overconfidence, and portfolio diversification bias. These insights have important

implications, as they show that rational investors may not always spot-on previous losses, potentially leading to market inefficiency.

This study attempts to detect herding behavior in the Indian Stock Market during critical events that negatively impacted the Indian economy, including the Asian Financial Crisis, Sub-Prime Mortgage Crisis, and Chinese Stock Market Turbulence.

Literature Review

King, M. (2001) conducted a study on "Who triggered the Asian financial crisis?" in order to examine the reason behind The Asian financial crisis. In late 1990 Japanese business banks faced a securities exchange bubble, due Thailand and Korea's leading creditors affected sentiments. By late 1997 the two nations withrdrew back their loans. The capital out flows set off a devaluation in mid-1997 in Thailand, however not in Korea until late 1997 leading to Asian Financial Crisis. Investigation recommends that pay focus on residential institutional financial investors and local institutions.

Hott, C. (2009), conducted a study on "Herding behavior in asset markets" examined the evidence of herding and its possibility to produce a price bubble. Study has built up a model with the help of asymmetric data and Baysian learning.

Guney Y. et al. (2017), have directed an examination on "Herding in frontier markets: Evidence from African stock exchanges" so as to explore herding in 8 African financial share markets, information has been gathered from January 2002 and July 2015 from all previously mentioned markets with smaller stocks. US and South African markets displays herding on few events, that financial specialists" conduct isn't altogether influenced by non-domestic factors.

Kremer S and Nautz D. (2013) have directed an examination on "Short-term Herding of Institutional Traders: New Evidence from the German Stock Market" so as to research short term herding of institutional investors. Information has been gathered from German securities exchange on a daily basis, it was seen that herding tends as increasingly seen in small promoted stocks or during the midst of market stress.

Galariotis, EC. Krokida, SI. and Spyrou, S.I. (2016) have directed an examination "Herd behavior and equity market liquidity: Evidence from major markets" so as to understand the connection between herding and equity market liquidity for which value information for G5 markets, by utilizing Variance decomposition tests, it was discovered that there exists a critical proof of herding for high liquid shares, for most nations yet just Germany has insignificant evidence of herding in high liquidity stocks.

Litimi H, Bensaida A. and Bouraoui, O. (2016), have directed an examination on "Herding and excessive risk in the American stock market: A sectoral analysis" with an aim to test in the whether herding is a main force for volatility and bubbles in US financial share market. Data from US stock exchange during 4 market stress period has been used. Granger causality test has been applied and it was discovered that herding is an important reason for bubbles and market volatility.

Singh, V. (2013), led an examination on "Did institutions herd during the internet bubble?" to examine the investing behaviour of institutional financial specialists during the bubble burst in 1998-2001, and its impact on stock prices multifaceted investments among NASDAQ 100 stocks.]This finding are institutional herding may have added another factor to the bubble by making short term price pressures.

Bhaduri, SN and Mahapatra, SD (2013), have directed investigation on "Applying an alternative test of herding behavior: A case study of the Indian stock market" with a goal to presents an alternative way to deal with testing herding in Indian stock market by utilizing symmetric properties of cross-sectional distribution return to recognize herding during 2007 incident. Paper additionally finds that incremental changes in security return is generally lowering the up market in contrast with the down market. Finding is in opposition to the findings by McQueen et al. (1996).

Lin, A.Y.and Lin, YN. (2014), have directed an examination on "Herding of institutional investors and margin traders on extreme market movements" so as to find herding inclination of outside and local institutional investors and margin

brokers by utilizing daily purchase and sell information in Taiwan's securities exchange. It was discovered that margin brokers and investors have propensity to sell fast failures stocks when market value decreases and purchase winners when huge market value increases.

Sharma SS, Narayan P and Thuraisamy K. (2015) have directed an investigation on "Time-Varying Herding Behavior, Global Financial Crisis, and the Chinese Stock Market" so as to evaluate the proof of herding conduct on Shanghai and Shenzhen stock markets. It was discovered that there exists a solid proof of herding conduct on 2 Shanghai and Shenzhen stock trades and herding conduct is segment explicit and prevalent in modern and properties divisions.

Xie, T, Xu, Y. and Zhang, XS. (2015) have directed an investigation on "A new method of measuring herding in stock market and its empirical results in Chinese A-share market" with check herding in both the stock markets. Study used Arbitrage Pricing Theory. It was found that market stress period caused herding. It was discovered that herding is a present in both the markets and is sector specific.

Celiker, U et al. (2015) have directed an investigation on "Do mutual finances herd in industries?" to investigate does mutual fund herd specific to industries. Strategy embraced was Lakonishok et al. (1992) and Sias (2004). It was discovered that herd behavior in industries by mutual fund is identified with industry momentum phenomenon originally recorded by Moskowitz and Grinblatt (1999).

Economou F et al. (2016) have conducted a study on "Testing for herding in the Athens Stock Exchange during the crisis period" in order to examine whether herding exist in the Athens Stock Exchange. Dataset of everyday recorded stock from 2007 to May 2015 of Greek stock market has been utilized and technique received was cross sectional standard dispersion and quantile regression strategy. It was discovered that there is presence of herding under various market stress period in Greece.

Garg, A. et al. (2013) have led an examination on "Do investors herd in Indian market" with a target to look at evidence of herd behaviour in Indian capital market in extraordinary economic situations utilizing information from National Stock Exchange. Data from 2000-2013 day to day, week after week, and month to month information has been utilized, thus giving proof against evidence of herd in Indian stock exchange for a considerable time period of 2000-13. Indeed, even proof of herding is not found through very high and low markets.

Nakagawa R, Oiwa H and Takeda F (2012) have directed an investigation "The Economic Impact of Herd Behavior in the Japanese Loan Market" with a goal to check whether inefficient herding of Japanese money financial institutions in local credit market influenced real economy for which information between 1975 and 1999 has been utilized. It was discovered that decline of actual economy in 1990s may have been the reason for herding in Japanese credit market.

Research Methodology

The study's focus is on analyzing if "herd" behavior has been present in the Indian stock market for the previous twenty four years, from 1995 to 2019. The Chinese Stock Market Turbulence, the Subprime Mortgage Crisis, and the Asian Financial Crisis—three major critical incidents that have had the greatest impact on the Indian capital market over the past twenty four years—have been divided into three major categories for the purpose of conducting a critical incident analysis. The models provided by Chang, Cheng, and Khorana (2000) for Cross Section Absolute Deviation (CSAD) were used for the analysis.

Descriptive Statistics

The descriptive statistics of CSAD on monthly, weekly, and daily data for the whole sample period from January 1995 to May 2019 are explained in Table 1.1.

Table 1.1: Descriptive Statistics of CSAD data (Jan 1995 – May 2019)

Table 1.1: Descriptive Statistics of CSAD data the Monthly, weekly and daily Data (Jan 1995 – May 2019)			
CSAD (Cross Section Absolute Deviation)			
Statistics	**Daily**	**Weekly**	**Monthly**
Mean	0.0258	0.0503	0.1077
Maximum	3.9394	0.1928	0.4312
Minimum	-0.1118	8.10E-06	1.14E-05
SD	0.1237	0.0206	0.0445
Skewness	15.79	1.3586	2.1790
Kurtosis	337.35	7.3523	13.7691
Jarque-Bera	2810.86	1388.74	1625.23
Probability	0.0000	0.0000	0.0000
ADF Statistics	-8.8007[a]	-4.8579[a]	-7.5741[a]
No. of Obs	5981	1266	289

The univariate statistics of daily mean CSAD (Cross Sectional Absolute Deviation) returns for monthly, weekly, and daily data from January 1995 to May 2019 is presented here. For CSAD, the daily data, the average return is 0.0258 with a maximum of 3.9394 and a minimum of -0.1118, the average return of the weekly data for the CSAD series is 0.0503 with a maximum of 0.1928 and a minimum of 8.10E-06, and the average return of the weekly data for the CSAD series is 0.1077 with a maximum of 0.4312 and a minimum of 1.14E-05.

Herding is likely to occur with daily data, as it has a higher dispersion (standard deviation) compared to weekly and monthly data. The Jarque-Bera test finds out that the non-normality of data, with a p-value of 0.00. Skewness values are positive, indicating non-normality. Kurtosis values are greater than 3, indicating leptokurtic data with non-normality. The large sample sizes (5981 for daily, 1266 for weekly, and 289 for monthly data) suggest that the normality assumption is not necessary, as the data is considered large. The ADF (Augmented Dickey Fuller) test with an intercept rejects the null hypothesis of a unit root in the CSAD series for all frequency levels (monthly, weekly, and daily), indicating that the data is stationary

Table 1.2: Descriptive Statistics of R_{mt} (Market Return) data the Daily , Weekly and Monthly Data (Jan 1995 – May 2019)			
R_{mt} (Market Return)			
Statistics	**Daily**	**Weekly**	**Monthly**
Mean	0.0121	0.0031	0.0379
Median	0.0026	0.0038	0.0421
Maximum	3.6283	0.2322	0.4248
Minimum	-4.0083	-0.1748	-0.2805
SD	0.4941	0.0321	0.0781
Skewness	-0.7101	-0.0535	-0.0142
Kurtosis	16.769	6.2026	5.8681
Jarque-Bera	47941.15	541.64	99.061
Probability	0.0000	0.0000	0.0000
ADF Statistics	-62.50[a]	-20.57[a]	-12.81[a]
No. of Obs	5981	1266	289

The analysis provides univariate statistics for the Rmt (Market Return) data series over different time frequencies (monthly, weekly, and daily) spanning from January 1995 to May 2019. Here are the key findings:

For daily returns, the average daily return is 0.0121, the maximum daily return is 3.6283, the minimum daily return is -4.0083 with standard deviation of 0.494048. For weekly returns, the average weekly return is 0.0031, the maximum weekly return is 0.2322, the minimum weekly return is -0.1748 with standard deviation of 0.032109. For monthly returns, the average monthly return is 0.0379, the maximum monthly return is 0.4248, the minimum monthly return is -0.2805with standard deviation of 0.0781

These statistics specify that daily data for Rmt (Market Return) is more volatile (higher standard deviation) compared to weekly and monthly data, suggesting a higher likelihood of herding behavior in daily data.

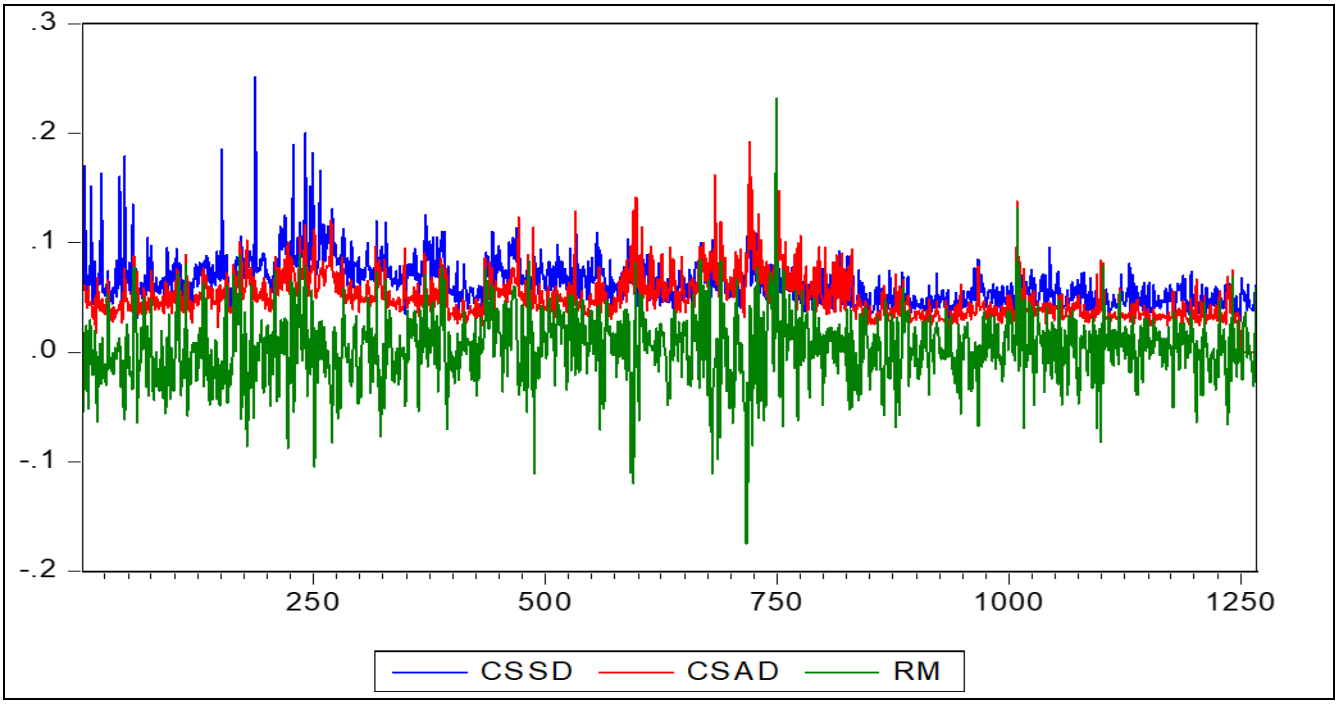
The normality of the data was examined using the Jarque-Bera test, which showed that the data's residual distribution is not normally distributed (p-value < 0.001). Skewness values are positive, indicating non-normality, and kurtosis values exceed 3 in all data subsets, indicating leptokurtic and non-normal data.

Considering the Central Limit Theorem, the large sample sizes (5981 for daily, 1266 for weekly, and 289 for monthly data) suggest that the normality assumption is not necessary due to the data's size.

The stationarity of Rmt (Market Return) data at different frequencies was confirmed using the ADF test with an intercept. The null hypothesis of no unit root was rejected (p-value = 0), indicating that the Rmt series is stationary in all time frequencies.
A figure (Figure 1.1) illustrates market return, cross-section standard deviation, and cross-section absolute deviation of the data.

In summary, the analysis provides insights into the statistical properties of Rmt (Market Return) data, suggesting its non-normality and the importance of considering data frequency when analyzing financial data.

Figure 1.1: Market Return, CSSD, CSAD



The weekly data CSSD, CSAD, and R_{mt} for the whole sample period from January 1995 to May 2019 are represented in the graph 1 above.

During the bull phase of the Asian Financial Crisis, the CSAD model was used to detect herding, as shown in Table 1.3.

Table 1.3: Regression Results for $CSAD_t$ (CCK Model)

			$(CSAD_t = \alpha + \beta_1 R_{mt}l + \beta_2 R_{mt}^2 + e_t)$												
			A	t statistics	□□	t statistics	□□	t statistics	AR (1)	t statistics	Adjusted R^2	F statistics	ARCH F statistics	Observed R^2	Durbin – Watson
ASIAN FINANNCIAL CRISIS	BEFORE (1995_96)	**Daily**	0.0094***	20.87	0.5634***	8.71	4.2725***	2.43	0.1762	2.41223	0.8272	310.63***	0.042	0.042	2.02
		Weekly	0.0129***	11.98	0.3256**	3.21	-2.5882*	-1.38	0.2361	3.8611	0.1758	17.00***	2.778	2.76	1.96
		Monthly	0.1263***	8.45	-0.6780*	-2.20	5.8909*	4.50	0.2054	0.9170	0.8006	30.45*	0.352	0.38	1.90
	DURING (1997-98)	**Daily**	0.0129***	11.98	0.3256**	3.21	-2.5882*	-1.38	0.2362	3.8611	0.1758	17.00***	2.778	2.76	1.96
		Weekly	0.0446***	21.47	0.2639***	1.77	3.6697	1.97	0.2456	2.4587	0.7904	89.63***	1.895	7.19	1.92
		Monthly	0.1252***	8.65	-0.682**	-2.23	6.0070***	4.51	0.2356	2.356	0.8026	47.75***	0.248	0.26	1.84
	AFTER (1999_00)	**Daily**	0.0211***	17.66	-0.0203*	-0.17	0.4162*	0.18	0.1970	3.1220	0.0274	3.379**	0.155	0.15	1.99
		Weekly	0.0657***	15.48	-0.4021*	-1.76	9.9813**	3.74	0.4525	3.4803	0.5179	20.71***	1.941	1.94	1.96
		Monthly	0.1265***	6.85	-0.1634*	-0.5931	2.7512**	3.0252	0.4385	1.95	0.7872	28.1327***	0.2578	0.2541	1.9252

The analysis focuses on herd behavior in the Indian stock market during different periods, including the bull phase of the Asian Financial Crisis. Here are the key findings:

The Bull Phase of Asian Financial Crisis (Pre-Crisis, 1995-96), The coefficients of the squared terms of daily market returns are mostly positive but occasionally negative and significant, suggesting the absence of herd behavior.The Durbin Watson test indicates no autocorrelation in the residual term. The ARCH LM test confirms that the data is homoscedastic.

The Asian Financial Crisis (Crisis, 1997-98), Similar to the pre-crisis period, the coefficients of squared terms of market returns for the entire data in the said period are positive and significant, indicating no herd behavior. No autocorrelation is found in the residual term according to the Durbin Watson test. The data remains homoscedastic based on the ARCH LM test.

The Post-Crisis Period (1999-00), In the post-crisis period, daily data shows one negative but significant coefficient, while the others are positive and significant, again indicating no herd behavior.

Evidence of herding through CSAD model during the bull phase of Sub Prime Mortgage Crisis.

Table 1.4: Regression Results for $CSAD_t$ (CCK Model)

				$(CSAD_t = \alpha + \beta_1 R_{mt} + \beta_2 R_{mt}^2 + e_t)$										
			α	t statistics	□□	t statistics	□2	t statistics	Ar(1)	t statistics	Adjusted R^2	F statistics	ARCH F statistics	Observed R^2	Durbin Watson
SUBPRIME MORTGAGE FINANCIAL CRISIS	BEFORE (2001-06)	Daily	0.0155***	25.17	0.2615***	4.98	-0.4122***	-0.36	0.5257	18.24	0.3864	187.00***	0.4125	0.40	2.11
		Weekly	0.0506***	18.66	0.0895***	0.58	-0.4995***	-0.23	0.18	15.27	0.1800	15.27***	1.8606	1.86	2.13
		Monthly	0.1251***	10.66	1.8066***	1.34	-0.1861***	-0.67	-		0.0495	2.32***	0.2698	0.27	1.96
	DURING (2007-08)	Daily	6.45E-05***	6.45E-05	0.9871***	233.09	0.2196***	2.81	-		0.9992	17.54***	0.0713	0.07	1.99
		Weekly	0.0506***	5.87	0.5661***	1.101	0.6501***	0.11	0.1159	0.79	0.2264	5.87***	0.0409	0.042	2.08
		Monthly	4.5806***	0.10	212.93***	3.891	-1052.17***	-3.91	0.9276	3.61	0.575	5.97***	0.5915	0.678	1.99
	AFTER (2009-12)	Daily	0.0066***	9.62	0.0101***	5.447	-0.0011***	-1.29	0.2414	5.93	0.2669	68.24***	0.4025	0.418	2.04
		Weekly	0.0478***	11.83	0.2306***	1.735	-1.0519***	-1.61	0.433	5.11	0.2189	12.21***	3.4034	3.364	2.26
		Monthly	0.0729***	9.32	0.2374***	1.655	1.4299***	4.11	-		0.9004	132.09***	4.1267	3.844	1.79

The Table 1.4 depicts The absence of herding behavior during market upswings is indicated by positive coefficients of the squared terms of daily market returns ($\lambda 1$), which are generally positive and significant. Additionally, $\lambda 2$ is positive and significant in the entire data in the said period, indicating no herding behavior. The Durbin Watson test on the residual term suggests no autocorrelation, and the data is homoscedastic according to the ARCH LM test. During the pre-crisis period (2001-06), $\boldsymbol{\alpha}$, $\lambda 1$, $\lambda 2$, and AR(1) are mostly positive and significant in the entire data in the said period, with some exceptions that are negative but still significant. This suggests the absence of herding in the pre-crisis era. During the crisis period (2007-08), $\boldsymbol{\alpha}$, $\boldsymbol{\beta} 1$, $\boldsymbol{\beta} 2$, and AR(1) are positive and significant, with occasional exceptions in the entire data in the said period, indicating no presence of herding during the crisis. In the post-crisis period (2009-12), the majority of coefficients remain positive and significant in the entire data in the said period, with some exceptions. The

residual term exhibits no autocorrelation, and the data is homoscedastic, indicating no herding during the post-crisis period as well.

Evidence of herding through CSAD model during the bull phase of Chinese Stock Market Turbulence.

Table 1.5: Regression Results for $CSAD_t$ (CCK Model)

			$(CSAD_t = \alpha + \beta_1 R_{mt} + \beta_2 R_{mt}^2 + e_t)$												
			□	t statistics	□1	t statistics	□2	t statistics			Adjusted R^2	F statistics	ARCH F statistics	Observed R^2	Durbin-Watson
CHINESE STOCK MARKET TURBULENCE	BEFORE (2013–14)	Daily	0.0174***	25.07	0.0005*	0.566	6.99E-05*	0.212	0.3466	6.172	0.126	14.56***	0.48	0.486	2.14
		Weekly	0.0311***	26.59	0.3107**	5.127	3.731***	6.727	0.1856	1.297	0.928	252.88***	1.92	1.930	2.02
		Monthly	0.0972***	3.803	0.0663*	0.091	-0.126**	-0.0304	-	-	-0.149	0.0256***	0.14	0.166	1.99
	DURING (2015-16)	Daily	0.0169***	33.14	0.0014*	0.957	-0.0006*	-0.818	0.2733	4.796	0.069	7.8515***	1.65	8.185	2.02
		Weekly	0.0309***	27.23	0.1053*	1.236	6.9207**	5.48	0.1920	1.461	0.833	100.77***	0.013	0.013	2.00
		Monthly	0.0804***	5.858	-0.245**	-0.43	4.2302*	0.861	-	-	0.015	1.1012***	0.263	0.304	2.02
	AFTER (2017-19)	Daily	0.0118***	3.624	0.9802**	47.47	0.0048***	0.658	-	-	0.963	5959.81***	7.91E-05	7.32E-05	2.00
		Weekly	0.0209***	3.902	0.2991**	3.273	5.1427*	3.071	0.8717	12.76	0.847	133.89***	6.65E-05	7.95E-05	2.61
		Monthly	95.351***	3.001	0.7471**	1.205	-10.918*	-1.787	0.9999	2.888	0.473	5.501***	0.215	0.244	1.66

The data in Table 1.5 reveals herd behavior in the Indian stock market during periods of growth, but a lack of herding behavior during market upswings. This is evident from the positive coefficients of squared terms of daily market returns, which are mostly positive but occasionally negative, and are consistently positive and significant in daily, weekly, and monthly market returns, indicating no herding behavior.

The Durbin Watson test shows no autocorrelation in the residual term, and the data is homoscedastic as determined by the ARCH LM test. In the pre-crisis period (2013-14), the α, $\lambda 1$, $\lambda 2$, and AR(1) are predominantly positive and significant in the entire data in the said period, with some exceptions that are negative but still significant, indicating no herding. During the crisis period (2015-16), most coefficients, including α, $\boldsymbol{\beta}1$, $\boldsymbol{\beta}2$, and AR(1), are positive and significant, with occasional exceptions, suggesting no herding behavior. In the post-crisis period (2017-19), α, $\lambda 1$, and $\lambda 2$ are positive and significant, with α being positive except for one instance, while $\boldsymbol{\beta}1$, $\boldsymbol{\beta}2$, and AR(1) are positive and significant for all data frequencies. The residual term shows no autocorrelation, and the data is homoscedastic, indicating no herding during this period.

Evidence of herding through CSAD model during the bear phase of Asian Financial Crisis.
Table 1.6: Regression Results for $CSAD_t$ (CCK Model)

				$(CSAD_t = \alpha + \beta_1 \lvert R_{mt} \rvert + \beta_2 R_{mt}^2 + e_t)$										
			□	t statistics	□1	t statistics	□2	t statistics			Adjusted R^2	F statistics	ARCH Fstatistics	Observed R^2	Durbin-Watson
ASIAN FINANCIAL CRISIS	BEFORE (1995–96)	**Daily**	0.0089***	29.73	-0.0726	-1.593	11.69***	8.667	0.5368	0.145	0.518	146.50***	0.153	0.1549	1.99
		Weekly	0.0345***	19.29	0.1751**	1.251	6.6528*	2.923	0.0669	0.499	0.762	68.29***	0.218	0.2249	1.93
		Monthly	0.0532***	22.25	0.1754**	1.524	5.2589*	1.258	-	-	0.265	112.35***	0.125	0.1258	1.95
	DURING (1997-98)	**Daily**	0.0129***	13.01	0.6844*	0.403	0.1167*	0.116	0.2458	1.758	0.048	7.422***	0.031	0.0308	2.01
		Weekly	0.0404***	17.23	0.2029*	1.393	5.8241**	2.796	0.2322	1.713	0.734	50.88***	0.468	0.4822	2.00
		Monthly	0.0145***	15.35	0.1475*	0.654	6.586**	2.358	-	-	0.258	66.25***	0.457	0.552	1.98
	AFTER (1999-00)	**Daily**	0.0654***	13.91	-0.3035*	-1.276	6.4091*	2.391	0.3423	2.178	0.273	6.774**	0.151	0.1525	2.05
		Weekly	0.0603***	12.95	-0.2124*	-0.224	4.9125*	2.4158	0.2445	2.2577	0.247	7.658**	0.7584	0.2587	2.07
		Monthly	0.0417***	13.47	-0.2579*	-3.258	5.6578*	2.2577	-	-	0.358	8.259**	0.2585	0.2578	2.00

The table demonstrates herd behavior in the Indian stock market during periods of growth. The positive coefficients of the square terms of daily market returns, particularly λ_1 and λ_2, show a lack of herding behavior in these situations, and this absence of herding is consistent across the entire data in the said period. The Durbin Watson test confirms the absence of autocorrelation in the residual term, and the ARCH LM test verifies that the data is homoscedastic. In the pre-crisis period (1995-96), the coefficients for α, λ_1, and λ_2, and AR(1) are largely positive and significant in the entire data in the said period, except for some exceptions which are negative but still statistically significant, indicating no herding. During the crisis period (1997-98), α, $\boldsymbol{\beta}_1$, $\boldsymbol{\beta}_2$, and AR(1) are positive and significant for the entire data in the said period, with occasional exceptions, suggesting no herding behavior. In the post-crisis period (1999-00), α, λ_1, and λ_2, and AR(1) are mostly positive and significant in the entire data in the said period, except for some exceptions that are negative but still statistically significant, indicating no herding during this period. The residual term shows no autocorrelation, and the data is homoscedastic.

Evidence of herding through CSAD model during the bear phase of Sub Prime Mortgage Crisis.

Table 1.7: Regression Results for $CSAD_t$ (CCK Model)

			$(CSAD_t = \alpha + \beta_1 \lvert R_{mt} \rvert + \beta_2 R_{mt}^2 + e_t)$												
			□	t statistics	□1	t statistics	□2	t statistics	AR (1)	t statistics	Adjusted R^2	F statistics	ARCH F statistics	Observed R^2	Durbin-Watson
SUBPRIME MORTGAGE FINANCIAL CRISIS	BEFORE (2001–06)	**Daily**	0.0541***	14.104	-0.2538*	-1.214	4.8604*	2.387	0.226	2.332	0.1184	6.0625***	0.0001	0.0001	1.98
		Weekly	0.0523***	11.213	-0.2147*	-1.225	3.8258**	1.837	0.225	2.922	0.1254	5.4785***	0.0025	0.1414	1.99
		Monthly	0.0891***	6.379	-0.1416*	-0.298	3.3418*	1.023	0.292	1.516	0.1594	0.8851***	0.1223	0.1375	1.76
	DURING (2007-08)	**Daily**	0.0774***	1.502	-0.9925***	-382.7	0.1106*	3.211	0.023	0.352	251422	251422.0**	1.3066	1.3106	1.98
		Weekly	0.0774***	8.661	-0.1344*	-0.462	0.7529*	0.403	0.387	2.861	0.1009	2.872***	0.0985	0.102	2.17
		Monthly	1.4305***	0.618	-61.804*	-1.581	22.5112*	0.171	0.778	4.427	0.6269	10.524**	3.4247	3.159	2.04
	AFTER (2009-12)	**Daily**	0.0021***	2.526	0.0161***	8.355	-0.0025**	-3.462	0.233	4.937	0.4665	124.89**	25.031	23.74	2.14
		Weekly	0.0411***	8.795	-0.0165*	-0.051	7.2745*	1.521	0.458	4.951	0.4006	19.717**	3.1789	3.1349	2.20
		Monthly	0.0691***	8.952	0.7015*	1.801	-5.4515**	-1.307	0.241	0.911	0.0395	1.2321**	0.0031	0.0034	2.13

The table demonstrates herd in the Indian capital market during periods of increasing trends, marked by positive coefficients of daily market returns (λ_1 and λ_2). These positive coefficients suggest the absence of herding behavior across the entire data in the said period. Further, tests for autocorrelation (Durbin Watson) and heteroscedasticity (ARCH LM) confirm the data's homoscedastic nature. In contrast, during decreasing market trends, the coefficients (λ_1 and λ_2) predominantly exhibit positive, though sometimes negative but significant, values. This pattern negates the presence of herding in the Indian stock market, supported by the Durbin Watson test indicating a lack of serial correlation and the data's homoscedasticity. In entire, similar results are observed, with mostly positive and significant coefficients for the entire data in the said period, despite occasional negative but significant exceptions. These findings affirm the absence of herding behavior, and the residual term analysis reinforces this by indicating no autocorrelation and the data's homoscedastic nature during these market conditions.

Evidence of herding through CSAD model during the bear phase of Chinese Stock Market Turbulence.

Table 1.8: Regression Results for $CSAD_t$ (CCK Model)

			$(CSAD_t = \alpha + \beta_1 \lvert R_{mt} \rvert + \beta_2 R_{mt}^2 + e_t)$											
			□	t statistics	□1	t statistics	□2	t statistics	Ar(1)	t statistics	Adjusted R^2	F statistics	ARCH F statistics	Observed R^2	Durbin-Watson
CHINESE STOCK MARKET MELT DOWN	BEFORE (2001–06)	**Daily**	0.0177***	25.991	-0.000769*	-0.734	0.0004*	1.268	0.2829	4.011	0.078	6.32	0.472	0.476	2.08
		Weekly	0.0329***	17.716	0.2762*	2.763	4.1939*	2.667	0.5893	4.580	0.854	83.28	1.372	7.970	1.98
		Monthly	0.0802***	4.808	0.8333**	0.970	-11.59*	-1.233	-	-	0.062	0.003	0.985	1.152	2.20
	DURING (2007-08)	**Daily**	0.0162***	22.133	0.0017*	1.798	-0.0002*	-1.773	0.3049	4.604	0.095	1.781	0.004	0.522	2.04
		Weekly	0.0292***	21.529	0.3087***	3.283	4.3084***	3.54	0.0377	0.205	0.902	127.70	0.996	1.021	1.94
		Monthly	0.0785***	6.421	0.4344*	0.532	-4.1230*	-0.491	-	-	-0.233	0.1491	0.304	0.375	1.96
	AFTER (2009-12))	**Daily**	0.0074***	14.604	0.9818***	366.11	0.0081***	4.481	-0.1338	-1.562	0.999	291285.0	15.92	14.46	2.00
		Weekly	0.0151***	1.503	0.5048***	4.892	1.9253**	1.071	0.9147	13.27	0.907	167.97	0.182	0.189	2.53
		Monthly	0.0455***	2.366	1.3323***	1.475	-8.4432**	-1.219	-	-	0.0398	1.207	0.326	0.392	2.01

In increasing market trends, positive coefficients of daily market returns (λ_1 and λ_2) indicate an absence of herding behavior in the entire data in the said period. Additionally, tests for autocorrelation (Durbin Watson) and heteroscedasticity (ARCH LM) confirm homoscedastic data.In contrast, during decreasing market trends, the coefficients (λ_1 and λ_2) generally show positive, albeit occasionally negative but significant values, refuting the presence of herding behavior. The Durbin Watson test suggests a lack of serial correlation, and the data remains homoscedastic.In the entire period, similar patterns emerge with mostly positive and significant coefficients, despite occasional negative but significant exceptions. These results indicate no herding behavior, and the Durbin Watson test and analysis of heteroscedasticity reinforce this conclusion. Additional findings indicate no herding bias during various phases of the Chinese Stock Market Turbulence, Sub-Prime Mortgage Crisis, and the Asian Financial Crisis, based on the Cross Section Standard Deviation (CSSD) and Cross Section Absolute Deviation (CSAD) regression models.

Conclusion

This paper is devoted to test the existence of herding in the Indian Stock Market during the critical incidents which have had an adverse effect on Indian economy. The critical incidents were Asian Financial Crisis, Sub-Prime Mortgage Crisis and Chinese Stock Market Turbulence. The methodology adopted for the analysis was dummy regression models named as Cross Section Absolute Deviation. It was found that there exists no herding bias in the pre-crisis period, during crisis period and post crisis period of the Asian Financial Crisis, Sub-Prime Mortgage Crisis, Chinese Stock Market Turbulence.

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