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Herding Behavior in Stock Market of Bangladesh: A Case of Behavioural Finance

Abstract

The study investigates herding behavior in the stock market of Bangladesh using a measure called Cross-Sectional Absolute Deviation (CSAD). The findings suggest that herding behavior does exist in the stock market of Bangladesh, based on the analysis of daily data from 169 stocks listed on the Dhaka Stock Exchange (DSE). Furthermore, the study indicates the presence of potential asymmetries in herd behavior concerning market returns and trading volume. The herding behavior, as observed in the Bangladeshi stocks, exhibits asymmetric tendencies, implying that the strength of herding varies depending on different market conditions. Specifically, the results show that herding behavior is more pronounced when the market trading volume is high. In other words, when there is an increased trading activity in the market, the tendency for investors to engage in herding behavior becomes stronger.

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1. Introduction

Herding behavior is an alternative explanation of the way that investment choices are made. Herding in financial markets has been generally described as a behavioral tendency for an investor to follow the actions of others. Herding is also a signal of market inefficiency. Therefore, the existence of herding behavior suggests that the real-world market is not as efficient as the Rational Asset Pricing Model might expect. Practitioners are therefore interested in whether herding exists in the market, as the reliance on collective information, rather than private information, may cause prices to deviate from fundamental value and present profitable trading opportunities.

The dismal state of affairs that inhibit the proper functioning of Bangladesh's capital market can be visible through a close examination of various market aspects from the behavioral characteristic. Bangladesh's stock market has been developing throughout the last decade. It is always characterized as being inefficient and having a low standard of information disclosure, information irregularity, and weak market fundamentals. As we know that throughout the year 2011, market showed an extreme bearish trend. Before that, from 2008 to 2010, the stock market rose rapidly and formed a bubble after the 1996 crash. Given the structure of the Bangladeshi stock market, investors are more likely to follow the actions of others who are believed to be better informed about the market. This trading behavior is, in many ways, similar to that of investors in

other emerging markets who have been found to exhibit herding behavior. According to the findings of the study in emerging markets, herding behavior is believed to exist in the Bangladeshi stock markets, and it is examined in this study.

2. Literature Review

The standard economic theory is based on the assumption that economic agents are rational which is also behind rational asset pricing models, such as the Capital Asset Pricing Model (CAPM). The market is efficient when market prices reflect all information that is available to market incumbents. Given that the access to market information is (more or less) uniform, correlated movements in stock prices due to new information might be a rational response from investors who share similar information set, and not an evidence of herding (Bikchandani & Sharma, 2001). Obviously, some informational asymmetries persist, which is why, it is not uncommon for market commentators to explain stock price movements as a consequence of investor herd behavior.

Theoretical models of herding behavior have been developed in some studies, such as Scharfstein and Stein (1990) and Devenow and Welch (1996). The empirical evidence supporting herding behavior is inconclusive. Some studies report the presence of herding while others find no evidence.

Grinblatt et al. (1995) analyzed the momentum investment strategies and herding tendency of mutual funds using the 'unsigned herding measure' and the 'signed herding measure'. They found that 77% of the mutual funds are momentum investors. Addressing the same question, Wermers (1999) found that while mutual fund trading in average stock presents little sign of herding, those in trades of small stocks and growth-oriented funds exhibit a much higher tendency.

Christie and Huang (1995) first used a methodology based on Cross-Sectional Standard Deviation (CSSD) to measure return dispersion and proposed that individual securities' return dispersal would be reduced when herding behavior occurs. They argued that when there is no CSSD, and the relationship between CSSD and extreme market conditions is positive, it indicates that herding behavior occurs during movements of large price movements. Hwang and Salmon (2004) developeed a price-based model and measured herding behavior based on the cross-sectional dispersion of the factor sensitivity of assets. They found that when investors are behaviorally biased, their perceptions of the risk-return relationship of assets may be distorted.

Chang et al. (2000) extended the model developed by Christie and Huang (1995) and examined herding behavior in the USA, Hong Kong, Japan, South Korea, and Taiwan, using a method based on cross-sectional absolute deviation (CSAD). Their model takes into account the non-linear relationship between the dispersion in individual asset return and the returns of a market portfolio. However, Chang et al. (2000) proposed that this relationship should be negative and non-linear when herding behavior occurs because the absolute market return value increases, whereas the CSAD decreases, or increases at a decreasing rate.

Christie and Huang (1995) and Chang et al. (2000) noted that herding behavior may be more pronounced during periods of market stress. Potential asymmetries in herding behavior are examined as the trading environment is characterized by different states of market returns, trading volume, and volatility. Kallinterakis and Lodetti (2009) investigated in their study the influence of low trading volume on herding behavior in the Montenegro New Securities Exchange for the period between 2003 and 2008 utilizing the non-linear model and revealed no evidence

suggesting that low trading volume led to herding behavior.

Lao and Singh (2010) examined herding behavior in the Chinese and Indian stock markets. The findings of the study suggest that herding behavior exists in both stock markets depending on some market conditions. Relatively, there is a lower prevalence of herding behavior being detected in the Indian stock market. The study conducted by Yao et al. (2014) investigated the presence and prevalence of investor herding behavior in the Chinese A and B stock markets, focusing on the differences in herding behavior across these segmented markets. This suggests that herding behavior is more prominent in certain segments of the Chinese stock markets than others.

Komalasari et al. (2022) explored herding behavior in the financial market, which has been a popular theoretical concept since the 1990s. The primary contribution of this paper is the construction of a structured knowledge framework for herding behavior in the capital market. By elaborating and classifying empirical research into relevant dimensions, the study offers a reference point for comprehensively developing research on herding behavior.

Ahsan and Sarkar (2013) used DSE all-share price index (DSI) as a measure of market return to investigate herding behavior and found no such phenomena in the Bangladesh stock market. The methodology is inconsistent with the methodology of Chang et al. (2000) where the equally weighted index is used to investigate the herding behavior of the market. On the other hand, Sangit Saha (2019), in the examination of herding behavior, took the daily and monthly levels of DS30 index into consideration to study herding behavior in the Bangladesh stock market. The DS30 stocks are not representative of the overall market and fail to detect the herding behavior of the whole market. Ahsan and Sarkar (2013) and Sangit Saha (2019), however, did not mention whether stock return for individual stocks is adjusted for stock dividends and cash dividends and rights shares. Islam (2022) focused on investigating the presence and nature of herding behavior in the banking sector of Bangladesh. The findings of the study confirmed the existence of herding behavior in the banking industry throughout the entire study period. This suggests that investors in the banking sector tend to imitate each other's trading decisions, disregarding private information, and following the market trend. In contrast to the first two studies of the Bangladesh stock market, we considered all listed shares of the DSE which are available for the study period and considered the equal-weighted index (calculated by the authors for this study) instead of the DSI, DS20 index, or DS30 index. In the study conducted by Islam (2022), the focus was on the banking sector only but we studied all representative stocks to capture the herding behavior of the stock market.

As indicated by the literature discussed above, herding behavior is frequently found both in developed and emerging markets. From that perspective, the stock market of Bangladesh is one of the emerging markets where this study may find some new undiscovered aspects behind herding behavior.

3. Methodology

Christie and Huang (1995) and Chang et al. (2000) supported that herding can be expressed using cross-sectional analysis of asset returns since the smaller cross-sectional dispersion of returns indicates parallel movement with the cross-sectional mean return, that is to say, movement to some type of market consensus. Christie and Huang (1995) estimated the cross-sectional standard deviation (CSSD) of single stock returns with respect to market returns, which is expressed as:

$$CSSD_t = \sqrt{\frac{\sum_{i=0}^{n}\left(R_{i,t} - R_{m,t}\right)^2}{N-1}}$$

where

Ri,t is the observed stock return of firm i at time t;

Rm,t is the cross-sectional average return of m returns in the market portfolio at time t; and

N is the number of stocks in the market portfolio.

Although the cross-sectional standard deviation of returns is an intuitive measure for capturing herding behavior, it can be considerably affected by the existence of outliers. In contrast, the CSAD measure, being based on absolute deviations, is more robust to extreme values and provides a more balanced assessment of herding behavior. It is therefore less influenced by extreme values or outliers compared to the CSSD measure. The CSAD measure is symmetric and treats positive and negative deviations equally, which aligns with the notion that herding behavior can occur in both directions. This is particularly relevant when studying markets with potential asymmetries in herding behavior. So the use of the cross-sectional absolute deviation (CSAD), as a better measure of dispersion and in turn, herding behavior, is mainly followed throughout this study.

Herding behavior under normal market conditions:

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

$$CSAD_t = a + y_1\left|R_{m,t}\right| + y_2 R_{m,t}^2 + \varepsilon_t \quad (2)$$

where

Ri,t is the individual stock return of firm I at time t;

Rm,t is the average return of the equally-weighted market portfolio at time t, which represents the market return;

Y1 and Y2 are the coefficients of Rm,t and R2m,t respectively; and

N is the number of stocks in the market portfolio.

CSAD is not a measure of herding, instead the relationship between realized CSADt and Rm,t is used to detect herd behavior. Ex-post data is used to test the presence of herd behavior in our sample via the average relationship between CSADt and Rm,t.

Herding behavior during extreme market conditions:

$$CSAD_t^{Down} = a + y_1\left|R_{m,t}\right| \times D_t^L + y_2 R_{m,t}^2 \times D_t^L + \varepsilon_t \; if \; R_{m,t} < 0 \quad (3)$$

$$CSAD_t^{Up} = a + y_1\left|R_{m\,t}\right| \times D_t^U + y_2 R_{m\,t}^2 \times D_t^U + \varepsilon_t \; if \; R_{m\,t} > 0 \quad (4)$$

where

DtL=1 if the market return on day t lies in the extreme lower tail of the distribution, and is otherwise equal to zero; and

DtU =1, if the market return on day t lies on the extreme upper tail of the distribution; and is otherwise equal to zero.

In this study, the extreme down (up) market is defined as 1 percent, 2 percent, and 5 percent of the lower (upper) tail of the market return distribution.

The dummy variables are designed to capture the difference in investor behavior in extreme up or down versus relatively normal markets. The presence of negative and statistically significant γ2D and γ2U coefficients would be indicative of herd behavior. Here one, five, and ten percent of the observations in the upper and lower tail of the market return distribution define extreme price movement days.

Herding behavior during increasing and decreasing market:

$$CSAD_t^{Down} = a + y_1\left|R_{m,t}^{Down}\right| + y_2\left(R_{m,t}^{Down}\right)^2 + \varepsilon_t \; if \; R_{m,t} < 0 \quad (5)$$

$$CSAD_t^{Up} = a + y_1\left|R_{m,t}^{Up}\right| + y_2\left(R_{m,t}^{Up}\right)^2 + \varepsilon_t \; if \; R_{m,t} > 0 \quad (6)$$

where

Y1Down is the coefficient of the market portfolio return at time t when the market is declining; and

Rm,tDown is the market portfolio return at time t when the market is declining; similar is the case for Y1Up and Rm,tUp in an increasing market.

In the above two equations, absolute values are used to facilitate a comparison of the coefficient of the linear term. If during periods of relatively large price swings, market participants do indeed herd around indicators such as the average consensus of all market constituents, a non-linear relation between CSADt and the average market return would result. The non-linearity would be captured by a negative and statistically significant γ2 coefficient.

Herding behavior during high and low volume states:

$$CSAD_t^{V-high} = a + y_1^{V-high}\left|R_{m,t}^{V-high}\right| + y_2^{V-high}\left(R_{m,t}^{V-high}\right)^2 + \varepsilon_t \quad (7)$$

$$CSAD_t^{V-low} = a + y_1^{V-low}\left|R_{m,t}^{V-low}\right| + y_2^{V-low}\left(R_{m,t}^{V-low}\right)^2 + \varepsilon_t \quad (8)$$

where

Y1V-high is the coefficient of the market portfolio return at time t when the market is in high-volume state;

Rm,tV-high is the market portfolio return at time t when the market is in high-volume state; similar is the case for Y1V-low and Rm,tV-low when the market is in low-volume state; and

Vt is trading volume for listed stock in DSE at time t.

It is regarded to be high if it is above 30% of the trading volume in the sample period and low if it is below 30% of the trading volume in the sample period.

4. Data Collection And Data Sources

The data set used in this study covers the period from 3 January, 2007 to 29 December, 2011 and consists of 160 stocks that are listed in the Dhaka Stock Exchange (DSE). DSE was selected because it is the earliest established stock market in Bangladesh. In the study, a total of 1,197 daily return data was calculated based on the closing prices of each stock, and all the returns are adjusted for cash dividend, stock dividend, and rights issues. Other stocks in the DSE were not included in the analysis since data for them were not available for the study period.

169 out of 231 DSE-listed companies are selected initially. Other stocks are not selected because they were not listed during the sample period, amalgamated, or merged. Then, among these 169 companies, 9 are eliminated due to non-synchronized trading. Finally, this study is done with 160 companies where 9 companies are considered for only 3 years, from 2009 to 2011.

In determining the impact of herding behavior on the size of the stocks, the 160 companies from DSE have been separated into three market portfolios based on their size of market capitalization, which is represented by the average of five year-end market capitalizations. Group 1 consists of the smallest 15% of the stocks and Group 3 consists of the largest 15%, where the number of companies for each group is 24. Group 2 consists of all stocks in between these two groups.

5. Model Estimations and Empirical Result

5.1 Descriptive Statistics

Table 1: Descriptive Statistics

Statistics	$CSAD_t$	$R_{m,t}$
Mean	0.02256	0.00233
Standard Error	0.00027	0.00042
Median	0.02091	0.00252
Standard Deviation	0.00952	0.01469
Sample Variance	0.00009	0.00021
Kurtosis	10.4344	4.80862
Skewness	2.15761	-0.06343
Range	0.10983	0.18043
Confidence Level (95.0%)	0.00054	0.00083

Table 1 reports the descriptive statistics of daily equally weighted CSADs (Cross Sectional Absolute Deviations) and market return for the Bangladeshi stock market.

Table 1 presents some summary statistics for CSAD and equally weighted market portfolio return Rm,t for the sample stocks under examination. This statistic is calculated on the daily data of the 160 stocks listed in the DSE. In comparison with the findings of Lao and Singh (2010), the mean value and standard deviation of CSAD of the Bangladeshi stock market are greater than the Indian and Chinese markets, and the data distribution is highly positively skewed.

5.2 Measurement of Herding Behaviour

Table 2 reports the regression results using the Chang et al. (2000) measure for the Bangladesh stock market for the period of 2007-2011. The coefficient γ1 is positive and statistically significant. The coefficient γ2 is negative and also statistically significant, indicating the existence of herd behavior, i.e., as the average market return becomes large in absolute terms, cross-sectional return dispersion increases at a decreasing rate. In the Bangladesh stock market, γ2 coefficient may suggest that herding behavior is more pronounced in the market due to the increasing number of inexperienced individual investors since 2009.

Table 2: Regression Result of the level of Herding

α	0.007622*** (0.001)
Y_1	0.431751*** (0.048)
Y_2	**-5.23978*** (0.890)
AR (1)	0.511665*** (0.026)

Table 2 shows the coefficient of equation (2) where n=1,196 and AR(1) is lag 1 of the data series. Numbers in parentheses are standard errors. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent level, respectively.

Table 3 provides the herding regression results under extreme market conditions. The results suggest that herding is present during periods of extreme rising markets in Bangladesh stock markets. However, herding is present during periods of a down market in the 1% criteria but it is not significant. During extreme market conditions, the γ2 coefficients are significantly negative at 1% level of significance during extreme upward market movement and greater than those during normal and down market conditions in all three cut-off criteria.

Table 3: Herding Behavior during Extreme Market Returns

	Panel A: 10% criterion		***Panel B: 5% criterion***		***Panel C: 1% criterion***	
	Downward	**Upward**	**Downward**	**Upward**	**Downward**	**Upward**
α	0.011*** (0.001)	0.013*** (0.001)	0.011*** (0.001)	0.012*** (0.001)	0.011*** (0.001)	0.012*** (0.001)
Y_1	0.026 (0.079)	1.052*** (0.063)	0.035 (0.110)	1.466*** (0.083)	-0.271 (0.328)	1.515*** (0.209)
Y_2	0.5325 (1.526)	**-10.92*** (1.193)	0.339 (1.962)	**-15.488*** (1.361)	4.067 (4.523)	**-15.628*** (4.818)
AR (1)	0.426*** (0.041)	0.370*** (0.029)	0.427*** (0.428)	0.425*** (0.426)	0.431*** (0.041)	0.481*** (0.030)

Table 3 shows the coefficients of equations (3) and (4) for DSE where, for extreme downward market, n= 493 and for extreme upward market, n= 701. Numbers in parentheses are standard errors with different specifications. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent level, respectively.

It implies the presence of more severe herding behavior during an extreme price swing. It may be due to the irrational behavior of inexperienced individual investors who are easily misled by the media and blinded by greed and envy (Yao & Luo, 2009). Thus, they may exhibit much greater herding behavior under extreme market conditions. On the other hand, these findings may be explained by the positive feedback trading by the institutional investors during the upward market.

Table 4: Herding Behavior during Normal Market Returns

	Panel A: 10% criterion	Panel B: 5% criterion	Panel C: 1% criterion
a	0.00958*** (0.001)	0.008951*** (0.001)	0.008458*** (0.001)
Y 1	0.166698*** (0.036)	0.166357*** (0.026)	0.150598*** (0.026)
Y 2	-0.00425 (0.052)	0.124327*** (0.039)	0.256397*** (0.039)
AR (1)	0.562518*** (0.024)	0.548393*** (0.023)	0.502144*** (0.023)

Table 4 shows the coefficients of equations (3) and (4) but the change is, DtN=1 if the market return on day t lies between the extreme lower and upper tail of the distribution; and is otherwise equal to zero. For normal market, n= 1,195. Numbers in parentheses are standard errors with different specifications. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent level, respectively.

Table 4 highlights the regression results of herding behavior under normal market conditions where, for measuring herding behavior, the dummy variable DtN is used like the equation (3) and (4). DtN=1 if the market return on day t lies between the extreme lower and upper tail of the distribution; and otherwise equal to zero. In the 10% criterion, the γ2 coefficient is negative but not significant. So the Table 4 regression result exerts that there is no herding behavior in the normal market scenario in the Bangladesh stock market.

5.3 Asymmetric Herding Behavior

In this section, the possible asymmetric effects of herding during the periods of increasing or decreasing market return and high or low volume state are examined and the state in which herding behavior is much more acute is tried to be determined.

5.3.1 Asymmetric Effect of Market Return

Since the direction of the market return may affect investor behavior, we examine possible asymmetries in herd behavior, conditional on whether the market is rising or falling. The herding regression is estimated separately for positive and negative market returns. In the above analysis, when equations (3) and (4) are used, Table 3 shows that greater herding behavior exists during the extreme downward market condition which depicts there is asymmetric herding behavior in the Bangladeshi stock market.

Table 5: Herding Behavior in Increasing and Decreasing Market

	Panel A: Decreasing Market	*Panel B: Increasing Market*
α	0.010931*** (0.0 01)	0.01503*** (0.001)
Y_1	0.123384* (0.072)	0.376123*** (0.067)

γ_2	**-0.73692** (0.848)	2.409604*** (1.248)
AR (1)	0.412631*** (0.081)	0.208923*** (0.040)
Test Statistics		
F	43.77063***	464.873***

Table 5 shows the coefficients of equations (5) and (6), where for decreasing market condition, n= 527 and for increasing market condition, n= 663. Test statistics show the F-test results. F illustrated the test result for the null hypothesis that γ2UP =γ2DOWN. Numbers in parentheses are standard errors. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent level, respectively.

In Table 5, equations (5) and (6) are used to find out the herding behavior in increasing and decreasing market states where absolute value is used in the equation. It was mentioned in the methodology that dummy and absolute values may generate conflicting results. So, the regression result γ2 coefficient is negative but not statistically significant which means herding behavior may exist in the increasing market state but not in the increasing market state . In Table 5, F statistics are significant. It means herding behaviors may be asymmetric when the market is declining in the Bangladeshi stock market. In Table 3, the γ 2 coefficients are significantly negative when the market is rising, but positive when the market is falling. The possible explanation for these findings is that positive feedback trading is conducted by institutional investors. Nevertheless, during a down market, Table 3 may refer that investors seem to base their decision on their analysis rather than following market consensus (Ray, 2009).

5.3.2 Asymmetric Effect of Trading Volume

Moreover, the possible asymmetric effects of herding during periods of high or low volume are also measured in this study. Table 6 reports the regression results of the asymmetric volume herding. The results indicate that in the high-volume state, the coefficient γ2 for the DSE is negative and statistically significant, suggesting the presence of herding in these markets. In the low-volume state, the coefficient γ2 is positive and not statistically significant. Thus, the high trading volume may indicate the presence of herding behavior in the Bangladeshi stock market.

Table 6: Herding Behavior in High and Low Trading Volume State

	High Trading Volume	***Low Trading Volume***
α	0.008866*** (0.001)	0.007124*** (0.001)
γ_1	0.451193*** (0.098)	0.257217* (0.094)
γ_2	**-5.93766***** (1.602)	4.110136 (3.069)
AR (1)	0.45967*** (0.048)	0.538361*** (0.041)
Test Statistics		
F	50.53123***	105.1657***

Table 6 shows the coefficients of equations (7) and (8) where, in high trade volume state (above 30% of the trading volume), n= 358 and in low trade volume state (below 30% of the trading volume), n= 357. Test statistics show the F-test results. F illustrated the test result for the null hypothesis that γ2V-High =γ2V-Low. Numbers in parentheses are standard errors. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent level, respectively.

5.4 Robustness Test

To highlight the robustness, the study examiness the relationship between the herding phenomenon and the two principal elements of the market: the size of the stocks and the specific period.

5.4.1 The Size of the Stocks on Herding Behavior

In this study, an equally weighted portfolio measure is used, so that the results reported in Table 3 may be influenced by the smaller or larger stocks in the determination of herding behavior. Examining the relative influence of small versus large stocks is especially important because small stock portfolios may react differently under different circumstances relative to large stock portfolios. Such an asymmetric effect would affect the accuracy of the measurement of herding behavior.

Table 7: Comparison of Herding Behavior among Group 1, Group 2, and Group 3 over the same period, during Up and Down Market

Panel A: Regression Result over the Sample Period			
	Group 1	**Group 2**	**Group 3**
α	0.01031*** (0.010)	0.007445*** (0.001)	0.009192*** (0.001)
Y_1	0.522544*** (0.064)	0.421829*** (0.046)	0.408235*** (0.055)
Y_2	**-5.14113*** (1.175)	**-5.33273*** (0.860)	**-4.36693*** (1.031)
AR (1)	0.429165*** (0.025)	0.525589*** (0.024)	0.353229*** (0.027)
Panel B: Regression Result during Down Market			
α	0.013872*** (0.001)	0.010706*** (0.001)	0.01159*** (0.001)
Y_1	0.22452 ** (0.089)	0.093895 (0.073)	0.161274* (0.086)
Y_2	**-2.61287** (1.648)	**-0.29797** (1.362)	**-0.80783** (1.599)
AR (1)	0.336981*** (0.042)	0.4333 73*** (0.041)	0.275558*** (0.043)
Panel C: Regression Result during Up Market			
α	0.010059*** (0.001)	0.008038*** (0.001)	0.008675*** (0.001)
Y_1	0.777033*** (0.089)	0.690698*** (0.062)	0.567337*** (0.072)
Y_2	**-6.75951*** (1.629)	**-8.05761*** (1.176)	**-5.983 33*** (1.380)
AR (1)	0.376943*** (0.032)	0.428955*** (0.033)	0.335413*** (0.036)

Table 7 Panel A shows the coefficient results of equation (2), Panel B shows the coefficient results of equation (5), and Panel C shows the coefficient results of equation (6). Here, Group 1 includes the smallest 15% of all stocks in market capitalization, Group 3 includes the largest 15% of stocks in market capitalization, and Group 2 includes stocks in-between these two. Numbers in parentheses are standard errors. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent levels, respectively.

As mentioned before, 160 companies from DSE have been separated into three market portfolios based on their size of market capitalization. If the γ2 coefficient shown in all three portfolios in DSE is significantly negative and close in magnitude, it provides further support to the notion that size of the stocks is irrelevant to the level of herding behavior. From Table 6, it has been shown that strong herding behavior appears in all three groups in DSE as they are significantly negative in different market conditions. Thus, the results are robust across different groups of shares under different market conditions in DSE. γ 2 coefficients of all groups are significantly negative over the whole sample period where group 2, consisting of mid-cap stocks, shows extreme herd behavior. When the market experiences negative movement, the highest herding behavior is detected in Group 1 or the lowest 15% stocks. On the other hand, when the market is increasing, Group 2 or the mid-cap stocks has significantly negative coefficients and experiences herding behavior. Thus, these findings illustrate that herding behavior in Bangladesh is generally present in the mid-cap stocks.

5.4.2 The Stock Market Crash on the Level of Herding Behavior

Herding behavior may occur when uncertainty is high in the market. The magnitude of the herding behavior may have been higher during the period of the capital market crash. The negative impact of the capital market crash reduced investors' confidence in Bangladesh to a very low level and made the market highly volatile and uncertain in 2011.

Table 8: Level of Herding Behavior Before and After the Onset of the Stock Market Crash

	Panel A: Regression Result Before the Stock Market Crash	*Panel B: Regression Result during the Stock Market Crash*
a	0.007595*** (0.001)	0.012282*** (0.002)
Y_1	0.208898*** (0.056)	0.070255 (0.120)
Y_2	8.350112*** (1.721)	**-1.50014** (1.833)
AR (1)	0.519541****	0.493179*** (0.061)

Table 8 contains the results of equation (2) for DSE stocks before the stock market crash (01.01.2007 to 05.12.2010) and during the crisis (05.12.2010 to 29.12.2011). Numbers in parentheses are standard errors. ***, **, and * denote the null hypothesis is rejected at one percent, five percent, and ten percent level, respectively.

Bangladesh stock markets declined by approximately 69.64% in the year 2011. As a result, the herding behavior during the period from December 5, 2010 to December, 2011 is measured to capture the effect of the stock market crash. Table 8 proves that herding behavior is not evident before the stock market crash in the Bangladeshi stock market (Panel A). But during the stock market crash (Panel B), there is an existence of herding behavior (as denoted by the negative γ2 value) but it is not statistically significant.

6. Conclusion

This paper utilizes the Cross-Sectional Absolute Deviation (CSAD) approach to measure the herding behavior of the Bangladesh stock market. The findings of the study suggest the presence of herding behavior in the Bangladeshi market. Specifically, the analysis of daily data

indicates that all the sampled stocks listed in the Dhaka Stock Exchange (DSE) exhibit investor herding. In finding potential asymmetries in herd behavior concerning market returns and trading volume, the results reveal that herding behavior is observed when the market trading volume is high. However, no such asymmetries are found based on market returns, irrespective of whether the market is experiencing an upward or downward trend.

Moreover, the study uncovers that herding behavior is more pronounced during extreme market conditions, particularly when the market is in an extremely upward state. This suggests that herding behavior intensifies in response to extreme market movements. Additionally, the research identifies different herding behavior patterns for different-sized groups of shares in the Bangladeshi stock market. To be more specific, herding behavior is generally observed in mid-cap stocks, indicating that investors in this segment tend to exhibit stronger herding tendencies. Lastly, the study highlights that herding behavior in the Bangladeshi market is influenced by the negative impacts of stock market crashes, implying that market downturns amplify herding behavior among investors.

Overall, this study provides evidence of herding behavior in the Bangladeshi stock market, as measured by the CSAD approach. The findings demonstrate asymmetric tendencies in herding behavior related to trading volume; with stronger herding experienced during higher trading volume periods. Additionally, herding behavior is more prevalent during extreme market conditions, primarily in mid-cap stocks, and is influenced by stock market crashes.

The study's findings suggest the need for stronger governance and stricter regulations by security governing bodies to promote market efficiency and address herding behavior. The current policies in place have proven to be ineffective in achieving these goals. To mitigate herding behavior and promote rational investing, it is recommended to foster a diversified institutional investor base. This would bring about more informed and rational security analysis, leading to a decrease in speculative investing activities within the stock market. Measures such as disclosure rules, timely provision of data, and well-designed compensation contracts can contribute to making both markets and institutions more transparent.

However, there are still several avenues for further research that can contribute to a deeper understanding of herding behavior in the Bangladeshi stock market. One important area for future research is the exploration of causes and factors that trigger herding behavior. Another promising avenue for future research is the examination of herding behavior among different sectors within the stock market. Additionally, studying investors' investment decisions to identify herding behavior represents a promising research opportunity.

References

Ahsan, A. F., & Sarkar, A. H. (2013). Herding in Dhaka Stock Exchange. *The Journal of Applied Business and Economics,* 14, 11-19.

Cajueiro, D. O., & Tabak, B. M. (2009). Multifractality and herding behavior in the Japanese stock market. Chaos, *Solitons & Fractals,* 40(1), 497-504. https://doi.org/10.1016/j.chaos.2007.07.091

Caparrelli, F., D'Arcangelis, A. M., & Cassuto, A. (2004). Herding in the Italian Stock Market: A Case of Behavioral Finance. *Journal of Behavioral Finance,* 5(4), 222-230. https://doi.org/10.1207/s15427579jpfm0504_5

Chamley, C. P. (2003). Rational Herds: Economic Models of Social Learning (1st ed.). Boston University: Cambridge University Press. https://doi.org/10.1017/CBO9780511616372

Chang, E. C., Cheng, J. W., & Khorana, A. (2000). An examination of herd behavior in equity markets: An international perspective. *Journal of Banking & Finance,* 24(10), 1651-1679. https://doi.org/10.1016/S0378-4266(99)00096-5

Chiang, T. C., & Zheng, D. (2010). An empirical analysis of herd behavior in global stock markets. *Journal of Banking & Finance,* 34(8), 1911-1921. https://doi.org/10.1016/j.jbankfin.2009.12.014

Christie, W. G., & Huang, R. D. (1995). Following the Pied Piper: Do Individual Returns Herd around the Market? *Financial Analysts Journal,* 51(4), 31-37. https://doi.org/10.2469/faj.v51.n4.1918

Demirer, R., & Kutan, A. M. (2006a). Does herding behavior exist in Chinese stock markets? *Journal of International Financial Markets, Institutions and Money,* 16(2), 123-142. https://doi.org/10.1016/j.intfin.2005.01.002

Demirer, R., & Kutan, A. M. (2006b). Does herding behavior exist in Chinese stock markets? *Journal of International Financial Markets, Institutions and Money,* 16(2), Article 2. https://doi.org/10.1016/j.intfin.2005.01. 002

Devenow, A., & Welch, I. (1996). Rational herding in financial economics. *European Economic Review,* 40(3–5), 603-615. https://doi.org/10.1016/0014-2921(95)00073-9

Espinosa-Méndez, C., & Arias, J. (2021). COVID-19 effect on herding behaviour in European capital markets. *Finance Research Letters,* 38, 101787. https://doi.org/10.1016/j.frl.2020.101787

Froot, K. A., Scharfstein, D. S., & Stein, J. C. (1992). Herd on the Street: Informational Inefficiencies in a Market with Short-Term Speculation. *The Journal of Finance,* 47(4), 1461-1484. https://doi.org/10.1111/j.1540-6261.1992.tb04665.x

Grinblatt, M., Titman, S., & Wermers, R. (1995). Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior. *The American Economic Review,* 85(5), 1088–1105. http://www.jstor.org/stable/2950976

Gleason, K. C., Mathur, I., & Peterson, M. A. (2004). Analysis of intraday herding behavior among the sector ETFs. *Journal of Empirical Finance,* 11(5), 681-694. https://doi.org/10.1016/j.jempfin.2003.06.003

Graham, J. R. (1999). Herding among Investment Newsletters: Theory and Evidence. *The Journal of Finance,* 54(1), 237-268. https://doi.org/10.1111/0022-1082.00103

Hachicha, N. (2010). New sight of herding behavioural through trading volume. Economics Discussion Papers 2010-11, Kiel Institute for the World Economy (IfW Kiel)

Henker, J., Henker, T., & Mitsios, A. (2006). Do investors herd intraday in Australian equities? *International Journal of Managerial Finance,* 2(3), 196-219. https://doi.org/10.1108/17439130610676475

Hirshleifer, D., & Hong Teoh, S. (2003). Herd Behaviour and Cascading in Capital Markets: A Review and Synthesis. *European Financial Management,* 9(1), 25-66. https://doi.org/10.1111/1468-036X.00207

Hong, H., Kubik, J. D., & Solomon, A. (2000). Security Analysts' Career Concerns and Herding of Earnings Forecasts. *The RAND Journal of Economics,* 31(1), 121-144. https://doi.org/10.2307/2601032

Hwang, S., & Salmon, M. (2004). Market stress and herding. *Journal of Empirical Finance,* 11(4), 585-616. https://doi.org/10.1016/j.jempfin.2004.04.003

Islam, R. (2022). Herd behavior in the Bangladeshi banking sector. C*ogent Economics & Finance,* 10(1), 2139885. https://doi.org/10.1080/23322039.2022.2139885

Jagannathan, R., & Wang, Z. (1996). The Conditional CAPM and the Cross-Section of Expected Returns. *The Journal of Finance,* 51(1), 3-53. https://doi.org/10.1111/j.1540-6261.1996.tb05201.x

Komalasari, P. T., Asri, M., Purwanto, B. M., & Setiyono, B. (2022). Herding behaviour in the capital market: What do we know and what is next? *Management Review Quarterly,* 72(3), 745–787. https://doi.org/10.1007/s11301-021-00212-1

Kapusuzoglu, A. (2011). Herding in the Istanbul Stock Exchange (ISE): A case of behavioral finance. *African Journal of Business Management,* 5(27), 11210-11218. https://doi.org/10.5897/AJBM11.1984

Lakonishok, J., Shleifer, A., & Vishny, R. W. (1992). The impact of institutional trading on stock prices. *Journal of Financial Economics,*

32(1), 23-43. https://doi.org/10.1016/0304-405X(92)90023-Q

Lao, P., & Singh, H. (2011). Herding behaviour in the Chinese and Indian stock markets. *Journal of Asian Economics,* 22(6), 495-506. https://-doi.org/10.1016/j.asieco.2011.08.001

Mei, J., Scheinkman, J., & Xiong, W. (2004). Speculative Trading and Stock Prices: An Analysis of Chinese A-B Share Premia. NYU Working Paper, No. FIN-03-017. https://papers.ssrn.com/abstract=1298841

My, T. N., & Truong, H. H. (2011). Herding Behaviour in an Emerging Stock Market: Empirical Evidence from Vietnam. *Research Journal of Business Management,* 5(2), 51-76. https://-doi.org/10.3923/rjbm.2011.51.76

Saha, S. (2019). Herding Behaviour in Bangladesh stock market: a case of Dhaka stock exchange. Master's Thesis, Jyväskylä University, School of Business and Economics.

Scharfstein, D. S., & Stein, J. C. (1990). Herd Behavior and Investment. *The American Economic Review,* 80(3), 465-479. http://www.-jstor.org/stable/2006678

Trueman, B. (1994). *Analyst Forecasts and Herding Behavior: The Review of Financial Studies,* 7(1), 97-124. https://doi.org/10.1093/rfs/7.1.97

Welch, I. (2000). Herding among security analysts. *Journal of Financial Economics,* 58(3), 369-396. https://doi.org/10.1016/S0304-405X(00)00076-3

Wermers, R. (1999). Mutual Fund Herding and the Impact on Stock Prices. *The Journal of Finance,* 54(2), 581-622. https://doi.org/10.1111/0022-1082.00118

Yao, J., Ma, C., & He, W. P. (2014). Investor herding behaviour of Chinese stock market. *International Review of Economics & Finance,* 29, 12–29. https://doi.org/10.1016/j.iref.2013.03.002

Yao, S., & Luo, D. (2009). The Economic Psychology of Stock Market Bubbles in China. *World Economy,* 32(5), 667–691. https://doi.org/10.1111/j.1467-9701.2009.01176.x