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Behavioral Bias of Equity Investors in Different Market Conditions and Events in Pakistan Stock Exchange (PSX)

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Abstract: *The herding behavior of equity investors in the Pakistan Stock Exchange (PSX) is examined in this study. There are two ways to look at herding behavior: first, in different market conditions, like bull and bear, extreme and less extreme, high and low trading volume, and high and low volatility; second, in different events, like the month of Ramadan, the financial crisis of 2007–2008, and the Covid-19 pandemic. Financial herding behaviour is when equity investors follow the actions of other equity investors without making their own decisions because they lack information or they think others have more trustworthy information. Regression analysis using Newey West Consistent Estimators is performed on Pakistan Stock Exchange (PSX) daily stock market data ranging from January 2001 to June 2021. The study found that the herding behavior among equity investors is absent during extreme market conditions, less extreme market conditions, high trading volume, high market volatility, and low market volatility; however, it is present during low trading volume, the month of Ramadan, financial crisis (2007-2008) and during Covid-19 pandemic as well.*

Key Words: Herding Behavior, Month of Ramadan, Financial Crisis, Covid-19, Pakistan Stock Market (PSX), Market Volatility, Bullish and Bearish Market, CSSD, CSAD

Introduction

A paradigm shifts in the field of finance emerged with the advent of behavioral finance, marked by a departure from traditional financial theories. The roots of behavioral finance can be traced back to the 1970s when empirical investigations began to shed light on the impact of psychological factors on decision-making. Unlike traditional finance, behavioral finance is characterized by its interdisciplinary nature, drawing insights from psychology and cognitive science. As a relatively new and evolving area of study within finance, it explores how emotions and cognitive processes influence financial decisions. Emphasizing the departure from conventional financial theories, behavioral finance revolves around four key themes: Affect Theory, Heuristics & Biases, Prospect Theory, and Framing Effect. A pivotal moment in the development of behavioral finance occurred in 1979 when Tversky introduced the Prospect Theory. This theory serves as an alternative to the Expected Utility Theory (EUT), offering insights into decision-making under conditions of uncertainty. The Framing Effect, another psychological factor highlighted by TVERSKY (1979), gained prominence as the second major theme in behavioral finance. This phenomenon occurs when different hypothetical descriptions of the same problem emphasize distinct aspects of the potential outcomes. In essence, behavioral finance seeks to unravel the intricacies of decision-making by acknowledging the profound influence of human emotions and cognitive psychology, presenting a dynamic shift from the rigid assumptions of traditional finance.

The frame is influenced partially by the wording of the problem and partly by the decision maker's habits, standards, and personal qualities. They explain that each decision-making event consists of two distinct phases: the first, in which acts associated with differences and outcomes for decision choice are

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framed, and the second, in which acts related to differences and results for each decision choice are evaluated. According to traditionalists, unsystematic biases are expected to normalize at the market level and so have an impact on asset values. The behavioral finance study directly increases the chances of optimal decision making. The review of the literature recommends that there are certain cognitive and emotional biases that affect the investors' decisions.

The predominant behavioral bias significantly impacting investors' decision-making is herding behavior. Herding occurs when equity investors respond more to the actions of other investors rather than considering the actual behavior of the stock market and its fundamental transactions. In many instances, investors exhibiting herding bias tend to abstain from active decision-making. Instead, their choices are influenced by information from brokers, friends, and colleagues. In the realm of behavioral finance, where investors are viewed as irrational actors, decision-making departs from the traditional expected utility theory and aligns more closely with prospect theory. This shift acknowledges that investors, affected by herding behavior, may deviate from rational decision-making by relying on social cues and the actions of their peers rather than a thorough analysis of market fundamentals. Consequently, understanding and addressing herding behavior becomes crucial for a more nuanced comprehension of investor decision dynamics in behavioral finance.

This study analyses the HB in four aspects, which are discussed below, one by one. First, the HB examines the diverse areas of the market, i.e. extreme and less extreme. For herding estimation, two regression modals of Christie and Huang (1995) and Eric C. Chang, Joseph, and Cheng (2000). Fluctuate the prices from the average prices due to extreme herding behavior in the stock market (Hwang & Salmon, 2004). So, this phenomenon leads to market crises. Due to uncertainty in the marker the investors indulge in herding behavior and they consider the price of assets can increase. Fourth, this study analysis the herding behavior during the ongoing covid-19. The covid-19 disturbed the activity of the market. Overall, this study analyses the herding behavior in the Pakistan Stock Exchange (PSX) by considering the different conditions of the market, the Ramadan effect, financial crises as well and COVID-19.

Pakistan's stock exchange (PSX) was named Asia's best-performing market in 2016. According to MSCI, Pakistan was designated as the benchmark developing market index in May 2016. Most of the equity investors are indulge in herding behavior and follow the herd behavior in the market due to this behavior bear a loss in their investments. It is required to check to what extent the behavioral biases (especially herding behavior) exist in the Pakistan Stock Exchange (PSX) in different market conditions, during Ramadan, during the financial crisis as well as in ongoing Covid-19.

Most of the researchers worked on behavioural biases (cognitive & emotional) from developed and well as developing countries. They investigated the existence of herding behavior in various stock markets from different perspectives, i.e. Ramadan and financial crises. This study investigates the existence of herding behavior not only in different market conditions, during Ramadan and during financial crises but also in ongoing Covid-19.

This research aims to comprehensively examine herding behavior within the Pakistan Stock Exchange (PSX) across various market conditions. Firstly, the study will investigate the presence of herding behavior in both extreme and less extreme market conditions, providing insights into the behavioral patterns of investors during different levels of market fluctuations. Additionally, the research will explore herding tendencies during both bullish and bearish market conditions, shedding light on how investor behavior may vary in response to market trends.

Furthermore, the study will delve into the dynamics of herding behavior concerning high and low trading volumes, aiming to understand how market activity levels influence collective decision-making among investors. Similarly, an investigation into herding behavior during periods of high and low market volatility will be conducted, offering valuable insights into the impact of market uncertainty on investor behavior within the PSX.

Moreover, the research will explore the occurrence of herding behavior specifically during the holy month of Ramadan, providing a unique angle to understand how cultural or religious factors may influence investor decision-making in the PSX. The study will also extend its focus to significant financial crises, assessing the existence of herding behavior during such periods and its implications on market dynamics.

Lastly, the research will investigate the presence of herding behavior during the ongoing Covid-19 pandemic, aiming to understand how global crises and uncertainties may shape investor behavior within the PSX. By addressing these objectives, the study seeks to contribute valuable insights into the nuanced factors influencing herding behavior in the Pakistani stock market.

Significance of the Study

This study is helpful for all equity investors to deeply understand herding behaviour, particularly in the up and down market, high and low market trade volume, high and low market volatility during Ramadan, during financial crises, and the ongoing COVID-19 pandemic. This study is not only helpful to deeply understand the herding behavior in different market conditions and events but also facilitates the individual investors to receive a handsome return from their timely investment.

Literature Review

Herding behavior in different Market Conditions

There are usually three market conditions that exist in the PSX. The individual investors behave in the stock market according to the existing condition of the market. Shiller (2003) contends that herding behavior has existed from the time of the ancient tribes, as has the trend of group-based movement. Choi and Yoon (2020) investigated and found, first, herding behavior was present during the decreasing market period in both KOSPI and KOSDAQ stock markets. On the contrary, adverse herding behaviour was found in extreme market condition. According to the results, investors' sentiments were one of the key factors that affected herding behavior in the Korean stock market. Teng (2018) found that the investors' herding behaviour increases due to decreases in the maturity level of an investment portfolio. On the contrary, negative herding behavior impact was stronger when marketing was rising, when the fund was more than average, and when the longer period of fund was established during an expansionary period.

Except for Romania and Poland, Pochea, Filip, and Pece (2017) observed herding behavior in twelve Central and East European countries. When the market increased, and trade volume increased, investors were more confident, ignoring their own information and imitating each other to acquire stocks. Rizal and Damayanti (2019), when the market fell down, investors felt panic and anxiety and followed the market's declining trend, overselling the stock.

Javaira and Hassan (2015) investigated and did not find herding behaviour for the period 2002-2007 in the Pakistan stock market. No evidence was found for the RAPM, and the behaviour of the investors was inefficient. Structural factors of an economy have significant role for decision making process and these factors have no impact on herding behavior. Herding behavior was found during the liquidity crises of March 2005 in the Pakistan stock exchange due to asymmetric information and the presence of speculators.

Messis and Zapranis (2014) the finding reveal the existence of herding behaviour patterns in two different phases of time. It is observed that prominent difference exists among the portfolios during the herding period. The results confirmed the effect of herding on all concerned measures. The stocks showed higher levels of herding, and adverse herding was the cause of higher volatility, due to this reason, herding is an additional risk factor. Hsieh (2013), the firms were indulging more herding behavior with small capital and less turnover. On the contrary, individual investors indulge herding behavior with small size and higher turnovers. Regression analysis was used to estimate the equation and found relevant evidence of herding behavior in both markets. The investors of A-share showed herding behavior in the up-and-down market. They applied quintile

Herding behavior during Financial Crisis

The vast majority of empirical studies examine herding behavior in stock markets during financial crises. Many financial crises have occurred in the past, including the 1987 stock market crash in the US, the Asian financial crisis in 1997, and the financial crisis in 2007-08. The majority of the research indicates that there is a strong association between market returns during these crises. Chang, McAleer, and Wang (2020) argue that (1) in the case of low extreme oil returns, investors were most likely to engage in stock market herding behavior; (2) in the case of Severe Acute Respiratory Syndrome (SARS) and Covid-19, herding

behavior was observed during extremely high oil returns afterwards the Global Financial Crisis (GFC); and (3) herding behavior was observed during extremely low oil returns during the coronavirus SARS crises. The results of this study suggest that, during the GFC, investors were more concerned with asset losses, and as a result, they demonstrated herding behavior in the stock market. However, during SARS and COVID-19, investors worried and divested their holdings as a result.

Chang et al. (2020) investigated six stock markets that faced prohibition during the current Global Financial Crises (GFC). The empirical evidence showed that short-term hurdles not only influence herding formation but also adverse hurdles. Chen, Hua, and Jiang (2018) observed that contrarian methods were successful in the weekly occurrence. The investment techniques that rely on 'nearness' to the 52-week high or the time horizon of the fifty -two week' high were not lucrative. Contrarian profit was discovered to be quite high throughout the global crisis era of 2008-2012. Finally, the evidence of herding behavior in the Chinese market, as well as the severity of herding activity, were found to be positively connected with contrarian strategies.

HB during Ramadan

Yousaf, Ali, and Shah (2018) discovered that herding behavior was absent during market ups and downs. However, it was present on low trading volume days. Herding behavior was detected throughout 2005, 2006, and 2007, but not the rest of the time period, according to yearly analysis. During Ramadan, no herding activity was observed. Gavriilidis, Kallinterakis and Tsalavoutas (2016), herding behavior was significantly stronger within the month of Ramadan as compared to outside Ramadan. The significance of herding behavior was manifested on both Ramadan as well as non-Ramadan days. Overall, herding behavior significance within and outside Ramadan exists with some variation based on its levels across the markets in terms of relevant variables of market states, both locally and internationally.

HB during the ongoing Corona Virus 19 Outbreak

Many epidemics and pandemics have happened in history. These epidemics and pandemics killed millions of people. The most dangerous epidemics/pandemics were the Black Death (total death 75-200 million), Spanish flu (total death 70-100 million), the Plague of Justinian (total death 15-100 million), and HIV/AIDS (more than 35 million). The ongoing Covid-19 is also very dangerous and has killed millions of people as well as economic activities all over the world. It disturbed the economic activity in the Pakistan Stock Market, and the investors changed their investment methods.

Wu, Yang, and Zhao (2020) discovered that during the pandemic period, herding behavior was noticed in harsh market conditions. Due to COVID-19, herding behavior was more prevalent for expanding the market, smaller trading volume, and decreased market volatility.

During the Covid-19 crisis in the first quarter of 2020, Abdeldayem and Al Dulaimi (2020) discovered that the expectation of pandemic risk positively influenced herding behavior in the GCC stock markets. Overall, the study's findings were resistant to a variety of model specifications.

Research Hypotheses

H_1: HB exist during the extreme and less extreme market conditions
H_2: HB exist during bullish and bearish market conditions
H_3: HB exist during high and low trading volume market conditions
H_4: HB exist during high and low market volatility conditions
H_5: HB is present during the month of Ramadan
H_6: HB is present during the financial crises
H_7: HB is present during the ongoing Coronavirus 19 outbreak

Methodology of the Study

Data Description

This study conducts a thorough analysis of HB within the Pakistan stock market, focusing on the entire population of listed companies on the PSX. The sample for this research comprises 350 non-financial listed

firms on the PSX. Daily stock prices from the period 2001-2022 serve as the primary dataset for analysis. The data is strategically categorized into distinct market conditions, including extreme and less extreme situations, upward and downward trends, high and low trading volumes, and high and low volatility scenarios. Additionally, the study investigates specific events such as the month of Ramadan, financial crises, and the ongoing Covid-19 period to discern their impact on herding behavior. To ensure the reliability of the information, the data for this research is sourced from the reputable website www.khistocks.com. By employing a diverse set of market conditions and events, this study aims to provide a nuanced understanding of herding behavior in the context of the Pakistani stock market.

Models

There are several approaches for detecting HB in the stock market. To detect HB in the stock market, this study employs essentially two methodologies. First, Christie and Huang (1995) provide a method for detecting herding behavior in the stock market using dispersion, arguing that individual investors may follow market behavior rather than their own information during huge price changes. Individual investors' returns are nearly equivalent to the market return when they follow the market trend rather than their own information in the stock market. The formula for calculating the cross-sectional standard deviation is defined as follows:

$$CSSD_t = \sqrt{\frac{\sum_{i-1}^{N}(R_{it} - R_{mt})^2}{N-1}} \quad (1)$$

Batmunkh et al. (2020) employ the following model:

$$CSSD_t = \alpha + \beta_L D_t^L + \beta_U D_t^U + e_t \quad (2)$$

Furthermore, the coefficients are also positive due the presence of high volatility among individual stock returns.

$D_t^L$is a dummy variable that equals one when the daily market return falls in the extreme lower x percent of all observations and zero otherwise. $D_t^U$is a dummy variable that equals one when the daily market return falls in the extreme upper x percent of observations and zero otherwise. The extreme 1%, 5%, and 10% observations in the top and lower tails of the market returns distribution are used in this analysis.

CSSD and it is defined as:

$$CSAD_t = \frac{\sum_{i-1}^{N}|R_{it} - R_{mt}|}{N} \quad (3)$$

R_{it}, R_{mt}, and N are defined in the based model (1). Chang et al.(2000) state that as per the assumption of capital asset pricing model (CAPM). Chang et al. (2000) recommend the following model for testing the non-linearity:

$$CSAD_t = \alpha + \beta_1|R_{mt}| + \beta_2(R_{mt})^2 + e_t \quad (4)$$

CAPM states that β_1 must be positive and β_2 must be zero. When the market returns are large, the cross-sectional absolute deviation increases or decreases at a decreasing rate. And if β_2 is positive, this shows that market return increases and CSAD also increases. Therefore, it is evidence of the absence of herding behavior in the stock market.

Chang et al. (2000), for detecting the herding behavior recommend two other regression models in the bullish and bearish market conditions:

$$CSAD_t^{Up} = \alpha + \beta_1^{Bull} R_{mt}^{Bull} + \beta_2^{Bull} (R_{mt}^{Bull})^2 + e_t \quad (5)$$

$$CSAD_t^{Down} = \alpha + \beta_1^{Bear} |R_{mt}^{Bear}| + \beta_2^{Bear} (R_{mt}^{Bear})^2 + e_t \quad (6)$$

Where R_{mt}^{Bull} = positive market returns on day t

R_{mt}^{Bear} = negative market returns on day t

$CSAD_t^{UP}$ = CSAD when market returns are positive at day t

$CSAD_t^{Down}$ = CSAD when market returns are negative at day t

$$CSAD^{High} = \beta_0 + \beta_1^{High}|R_{mt}^{High}| + \beta_2^{High}(R_{mt}^{High})^2 + e_t \quad (7)$$

$$CSAD^{Low} = \beta_0 + \beta_1^{Low}|R_{mt}^{Low}| + \beta_2^{Low}(R_{mt}^{Low})^2 + e_t \quad (8)$$

$$CSAD_t^{\sigma 2-High} = \beta_0 + \beta_1^{\sigma 2-High}|R_{m,t}^{\sigma 2-High}| + \beta_2^{\rho 2-High}(R_{m,t}^{\sigma 2-High})^2 + e_t \quad (9)$$

$$CSAD_t^{\sigma 2-Low} = \beta_0 + \beta_1^{\sigma 2-Lowh}|R_{m,t}^{\sigma 2-Low}| + \beta_2^{\rho 2-Low}(R_{m,t}^{\sigma 2-Low})^2 + e_t \quad (10)$$

Where

$\sigma 2 - High$ = High market volatility

$\sigma 2 - Low$ = $Low\ market\ volatility$

$$CSAD_t = \beta_0 + \beta_1|R_{m,t}| + \beta_2(R_{m,t})^2 + \beta_3(R_{m,t})^2 \times DM_t + e_t \quad (11)$$

Tan et al. (2008) investigated the herding behavior during the financial crises particularly in Asian markets. The regression equation is

$$CSAD_t = \beta_0 + \beta_1|R_{m,t}| + \beta_2(R_{m,t})^2 + \beta_3(R_{m,t})^2 \times DM_t + e_t \quad (12)$$

"DM" is used for the period of financial crises; value one is assigned during the financial crises and 0 otherwise

In this way, this study uses the dummy (DM) during the COVID-19 pandemic days and zero otherwise. The regression equation is:

$$CSAD_t = \beta_0 + \beta_1|R_{m,t}| + \beta_2(R_{m,t})^2 + \beta_3(R_{m,t})^2 \times DM_t + e_t \quad (13)$$

Results and Discussion

Descriptive Statistics

Table 1 shows the summary statistics of three variables: market return (Rmt), cross-sectional standard deviation (CSSD) and cross-sectional absolute deviation (CSAD). The mean of Rmt, CSSD and CSAD are 0.0780, 4.2444 and 2.2188 respectively. The standard deviations of Rmt, CSSD, and CSAD are 1.2964, 2.4519, and 0.5275, respectively. The skewness of Rmt, CSSD and CSAD are -0.2450, 5.6674 and 1.3109, respectively, and the kurtosis of Rmt, CSSD and CSAD are 3.6898, 68.3823 and 3.6419, respectively. Q1 and Q3 of Rmt are -0.4946 and 0.7329, Q1 and Q3 of CSSD are 2.9330 and 4.7737, Q1 and Q3 of CSAD are 1.6792 and 2.5973 respectively.

Table 1

Descriptive statistics

Statistic	Rmt	C S SD	CS AD
M	.078	4.2444	2.2188
Median	.0978	3.595	2.0378
SD	1.2964	2.4519	0.8275
Skewness	-0.245	5.6674	1.3109
Kurtosis	3.6898	68.3823	3.6419
Q1	-0.4943	2.933	1.6792
Q3	0.7329	4.7737	2.5973

Extreme and Less Extreme Market Condition

Table 2 presents the results of a regression analysis examining herd behavior in both extreme and less extreme market conditions. The analysis is divided into two panels: Panel A focuses on extreme market conditions, while Panel B addresses less extreme market conditions. The coefficients, standard errors, t-statistics, and probabilities associated with various variables are reported.

In Panel A, during extreme market conditions, the variables DL (1%), DU (1%), DL (5%), DU (5%), DL (10%), and DU (10%) are examined. These represent different thresholds for measuring extreme market conditions. The coefficients for DL (1%) and DU (1%) are 1.2783 and 1.3807, respectively, with statistically significant t-statistics of 3.5944 and 4.1465, indicating a significant impact during extreme market

conditions at the 1% level of significance. Similar patterns are observed for other threshold levels, with coefficients and t-statistics suggesting herd behavior during extreme market conditions.

Panel B, on the other hand, focuses on less extreme market conditions and includes the variables Rmt and (Rmt)2. The coefficient for Rmt is 0.5416, and the associated t-statistic is highly significant at 14.4883, indicating a significant impact of market returns on herd behavior during less extreme conditions. However, the coefficient for (Rmt)2 is -0.0014, and the t-statistic is not statistically significant, suggesting that the squared market return does not have a significant impact on herd behavior during less extreme market conditions.

The adjusted R-squared values in both panels provide a measure of the goodness of fit of the regression models. In Panel A, the R^2 is 0.3322, indicating that the model explains approximately 33.22% of the variation in herd behavior during extreme market conditions. In Panel B, the adjusted R-squared is 0.3664, model explains around 36.64% of the variation in herd behavior during less extreme market conditions.

Overall, the results suggest that herd behavior is influenced by different factors in extreme and less extreme market conditions, as indicated by the significance of various variables in each panel. The sample size (N) for both panels is 5033, providing a robust dataset for the analysis.

Table 2

Herd behavior during extreme and less extreme market conditions

Panel A: Extreme Market Condition				
Variable	Coefficient	Std. Error	t-Stat	Probab.
DL (1%)	1.2783	0.3557	3.5944	0.0003
DU (1%)	1.3807	0.333	4.1465	0.000
DL (5%)	0.5417	0.2458	2.2037	0.0276
DU (5%)	0.7487	0.2172	3.4474	0.0006
DL (10%)	0.5125	0.2117	2.4209	0.0155
DU (10%)	0.5228	0.1432	3.6503	0.0003
Adjusted (R)2	0.3322			
N	5033			
Panel B: Less Extreme Market Condition				
Rmt	0.5416	0.0374	14.4883	0.0000
(Rmt)2	-0.0014	0.0083	-0.1700	0.865
Adjusted (R)2	0.3664			
N	5033			

Up and Down Market Condition

Table 3 provides insights into herd behavior in different market conditions, specifically focusing on the total market, market up, and market down scenarios. The analysis is divided into three panels: Panel A examines herd behavior in the total market, Panel B focuses on market-up conditions, and Panel C addresses market-down situations. The table includes coefficients, standard errors, t-statistics, and probabilities for the variables Rmt (total market) and (Rmt)2, as well as adjusted R-squared values and sample sizes (N).

In Panel A, during total market conditions, the variable Rmt (TM) has a coefficient of 0.0361 with a standard error of 0.0076. The t-statistic is 4.7771, and the associated probability is 0.0000, indicating that Rmt has a significant impact on herd behavior in the total market. Additionally, the coefficient for (Rmt)2 is 0.1128 with a highly significant t-statistic of 45.9314, suggesting a significant quadratic relationship with herd behavior during overall market conditions. The adjusted R-squared is 0.2957, implying that the model explains approximately 29.57% of the variation in herd behavior during the total market.

Panel C concentrates on market-down conditions, where Rmt (MD) has a coeff. Of 0.6443, a standard error of 0.0705, and a significant t-statistic of 9.1388. The coefficient for (Rmt) 2 is -0.0316, with a t-statistic of -1.7316, which is not statistically significant at conventional levels. The adjusted R-squared is 0.37107, indicating that the model explains approximately 37.11% of the variation in herd behavior during market-down conditions, with a sample size (N) of 2278.

Overall, the results suggest that market conditions play a crucial role in influencing herd behavior, and the relationship between market returns and herd behavior varies across the total market, market up, and market down scenarios, as indicated by the coefficients and significance levels in each panel. The adjusted R-squared values provide insights into the explanatory power of the regression models for different market conditions.

Table 3

Herd behavior during the total market, market up and market down

Panel A: Total Market				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Rmt (TM)	0.0361	0.0076	4.7771	0.0000
(Rmt)2	0.1128	0.0025	45.9314	0.0000
Adjusted (R)2	0.2957			
N	5033			
Panel B: MARKET UP				
Rmt (MU)	0.471	0.0282	16.6983	0.0000
(Rmt)2	0.0211	0.0065	3.2618	0.0011
Adjusted (R)2	0.3706			
N	2755			
Panel C: MARKET DOWN				
Rmt (MD)	0.6443	0.0705	9.1388	0.0000
(Rmt)2	-0.0316	0.0182	-1.7316	0.0835
Adjusted (R)2	0.37107			
N	2278			

High and Low Trading Volume

Table 4 investigates herd behavior in the context of high and low trading volumes, dividing the analysis into two panels. Panel A focuses on high trading volume (HTV) conditions, while Panel B explores low trading volume (LTV) scenarios. The variables Rmt (HTV) and Rmt (LTV), along with (Rmt)2. Additionally, adjusted R-squared values and sample sizes (N) are reported.

In Panel A, during high trading volume conditions, the variable Rmt (HTV) has a coefficient of 0.4674, a standard error of 0.0332, and a highly significant t-statistic of 14.0872, suggesting a substantial impact of market returns on herd behavior in high trading volume situations. However, the coefficient for (Rmt)2 is 0.0072, and the associated t-statistic is 0.8927, indicating that the squared market return is not statistically significant at conventional levels.

In Panel B, which examines herd behavior during low trading volume conditions, Rmt (LTV) has a coefficient of 0.5864, a standard error of 0.031, and a highly significant t-statistic of 18.9034, highlighting a significant influence of market returns on herd behavior in low trading volume scenarios. The coefficient for (Rmt)2 is -0.0058, and the t-statistic is 2.8272, indicating a statistically significant impact of the squared market return on herd behavior during low trading volume conditions.

The adjusted R-squared values in both panels provide insights into the explanatory power of the regression models. In Panel A, the adjusted R^2 is 0.355, suggesting that the model explains approximately 35.5% of the variation in herd behavior during high trading volume. In Panel B, the adjusted R-squared is 0.3688, indicating that the model explains around 36.88% of the variation in herd behavior during low trading volume.

Overall, the results suggest that trading volume levels have a differential impact on herd behavior, with market returns playing a significant role in both high and low trading volume conditions. The squared market return's significance varies between the two scenarios, highlighting the nuanced relationship between trading volume and herd behavior. The sample sizes (N) in each panel, 2231 for high trading volume and 2772 for low trading volume provide a robust dataset for analyzing herd behaviour under different trading volume conditions.

Table 4

Herd behavior during high and low trading volume

Panel A: High trading volume				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Rmt (HTV)	0.4674	0.0332	14.0872	0.0000
(Rmt)2	0.0072	0.0081	0.8927	0.3721
Adjusted (R)2	0.355			
N	2231			
Panel B: Low trading volume				
Rmt (LTV)	0.5864	0.031	18.9034	0.0000
(Rmt)2	-0.0058	0.007	2.8272	0.0082
Adjusted (R)2	0.3688			
N	2772			

High and Low Market Volatility

Table 5 examines herd behavior during periods of high and low market volatility, presenting results in two panels. Panel A focuses on high volatility (HV) conditions, while Panel B explores low volatility (LV) scenarios. The table includes coefficients, standard errors, t-statistics, and probabilities for the variables Rmt (HV) and Rmt (LV), along with (Rmt)2. Additionally, adjusted R-squared values and sample sizes (N) are reported.

In Panel A, during high volatility conditions, the variable Rmt (HV) has a coefficient of 0.4500, a standard error of 0.0319, and a highly significant t-statistic of 14.1059, indicating a substantial impact of market returns on herd behavior during high volatility periods. The coefficient for (Rmt)2 is 0.0125, with a t-statistic of 1.9570, suggesting that the squared market return is marginally significant at the 5% level.

In Panel B, which examines herd behavior during low volatility conditions, Rmt (LV) has a coefficient of 0.6125, a standard error of 0.0791, and a highly significant t-statistic of 7.7385, highlighting a significant influence of market returns on herd behavior during low volatility periods. However, the coefficient for (Rmt)2 is -0.0051, and the associated t-statistic is -0.2297, indicating that the squared market return is not statistically significant, suggesting a limited impact on herd behavior during low volatility.

The adjusted R-squared values in both panels provide insights into the explanatory power of the regression models. In Panel A, the adjusted R^2 is 0.4364, indicating that the model explains approximately 43.64% of the variation in herd behavior during high volatility. In Panel B, the adjusted R2 is 0.1804, suggesting that the model explains around 18.04% of the variation in herd behavior during low volatility.

Overall, the results suggest that market volatility levels have a differential impact on herd behaviour, with market returns playing a significant role in both high and low-volatility conditions. The squared market return's significance varies between the two scenarios, indicating nuanced dynamics in the relationship between volatility and herd behavior. The sample sizes (N) in each panel, 2012 for high volatility and 2991 for low volatility, provide a substantial dataset for analyzing herd behavior under different volatility conditions.

Table 5

Herd behavior during low and high volatility

Panel A: High Volatility				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Rmt (HV)	0.4500	0.0319	14.1059	0.0000
(Rmt)2	0.0125	0.0064	1.9570	0.0505
Adjusted (R)2	0.4364			
N	2012			

Panel B: Low Volatillity				
Rmt (LV)	0.6125	0.0791	7.7385	0.000
(Rmt)2	-0.0051	0.0224	-0.2297	0.8183
Adjusted (R)2	0.1804			
N	2991			

Herd behavior during Ramadan, Financial Crisis and Corona Virus 19 Pandemic

Table 6 investigates herd behavior during specific periods: financial crises (FC), the COVID-19 pandemic, and the month of Ramadan. The table is structured to capture the impact of market returns (Rmt) and its squared term ((Rmt)2) under these conditions. The results are presented with coefficients, standard errors, t-statistics, and probabilities. Additionally, there are interaction terms involving (Rmt)2 with indicators for the month of Ramadan (DM(Ram)), financial crises (DM(FC)), and COVID-19 (DM(Covid-19)). The adjusted R2 value and the sample size (N) are also reported.

The coefficient for Rmt (R, FC, Covid-19) is 0.5444, with a standard error of 0.0375 and a highly significant t-statistic of 14.5032. This indicates a substantial impact of market returns on herd behavior during the specified periods. The interaction terms provide insights into how the impact of (Rmt)2 varies during different conditions. The coefficient for (Rmt)2 * DM(Ram) is -0.036, with a t-statistic of -1.9903, suggesting a marginally significant negative relationship between the squared market return and herd behavior during the month of Ramadan. Similarly, the coefficients for (Rmt)2 * DM(FC) and (Rmt)2 * DM(Covid-19) are -0.0319 and -0.0182, respectively, with t-statistics indicating significant negative relationships during financial crises and the COVID-19 pandemic.

The adjusted R2 is reported as 0.3688, suggesting that the model explains approximately 36.88% of the variation in herd behavior during the specified periods. The sample size (N) is 5033, providing a robust dataset for analyzing herd behavior in the context of financial crises, the COVID-19 pandemic, and the month of Ramadan.

In summary, the results indicate that market returns have a significant impact on herd behavior during specified periods. The squared market return is not significant overall, but its interaction with indicators for Ramadan, financial crises, and COVID-19 highlights nuanced variations in the relationship between market returns and herd behavior during these specific conditions.

Table 6

Herd behavior during financial crises, covid-19 and the month of Ramadan

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Rmt (R,FC,Covid-19)	0.5444	0.0375	14.5032	0.0000
(Rmt)2	0.0003	0.0086	0.0296	0.9764
(Rmt)2 *DM(Ram)	-0.036	0.0181	-1.9903	0.0466
(Rmt)2 *DM(FC)	-0.0319	0.0151	2.1189	0.0341
(Rmt)2 *DM(Covid-19)	-0.0182	0.0063	-2.8742	0.0041
Adjusted (R)2	0.3688			
N	5033			

Conclusion

In conclusion, this study delved into the behavioral biases exhibited by equity investors in the Pakistan Stock Exchange (PSX) across various market conditions and events. The analysis examined the impact of factors such as extreme market conditions, market up and down movements, trading volume, market volatility, and specific events like financial crises, the coronavirus 19 outbreak, and the month of Ramadan on HB.

The findings revealed that market conditions and events significantly influence the behavior of equity investors. During extreme market conditions, investors tend to exhibit herd behavior, as evidenced by the coefficients and statistical significance of various variables. Additionally, the study observed nuanced dynamics in herd behavior during market up and down movements, with distinct impacts on investor decisions.

Furthermore, the analysis of trading volume and volatility indicated differential effects on herd behavior. High trading volumes and market volatility were associated with significant impacts on investor behavior, emphasizing the role of these factors in shaping market dynamics. The study demonstrated that during these events, investors showcased distinct behavioral biases, as reflected in the coefficients and interaction terms with squared market returns.

The overall findings contribute to the growing body of literature on behavioral finance, offering insights into the complexities of investor decision-making in the Pakistan Stock Exchange. Understanding these behavioral biases is crucial for market participants, regulators, and policymakers to make informed decisions and implement effective measures to mitigate potential risks associated with herd behavior.

As the financial landscape continues to evolve, recognizing the impact of behavioral biases in different market conditions becomes imperative for fostering a resilient and efficient stock market. Future research could explore additional factors and events influencing investor behavior, providing a more comprehensive understanding of the psychological aspects guiding investment decisions in the Pakistan Stock Exchange.

Future Research Gap

We selected 250 firms from various sectors listed on the Pakistan Stock Exchange in our study to examine the HB during diverse market circumstances and events; we did not select firms sector-wise. For future research, we recommend investigating the herd behaviour of equity investors by dividing them into diverse sectors of the Pakistan Stock Exchange, such as energy, textile, sugar, cement, etc. The results may be different for sector-wise firms than the results found in this study by selecting without sector-wise firms. Besides this, the herding behavior of equity investors may be investigated by dividing the firms into neglected stock and non-neglected stock.

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