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Title: **Investigating Investor Herding in the Pakistan Stock Market (PSX): A Sectoral Analysis**

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Investigating Investor Herding in the Pakistan Stock Market (PSX): A Sectoral Analysis

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Abstract

The current study aimed to delve into the phenomenon of investors herding within the Pakistan Stock Exchange (PSX) and its various sectors. It focused on patterns within sectors and on market conditions that are volatile. The research used established herding measures, Cross-Sectional Standard Deviation (CSSD), and Cross-Sectional Absolute Deviation (CSAD), proposed by Christie and Huang in 1995 and Chang et al. in 2000. The analysis relied on intraday, daily, and weekly return data from 620 listed firms. The evidence showed that return differences increase, rather than decrease, during times of high market activity. This indicates there is no significant herding at the overall market level or within individual sectors. These results challenge the usual assumptions in behavioural finance that investors follow during uncertain times. Instead, they suggest that investors in the PSX are more independent and rational. The study emphasized the need for regulatory strategies tailored to specific sectors. These strategies should recognize this independence and promote transparency, investor education, and evidence-based policymaking to improve market resilience.

***Keywords*:** cross-sectional absolute deviation, cross-sectional standard deviation, herding behaviour, Pakistan stock market

JEL Codes: G11, G12, G14

Introduction

Behavioural finance is mainly concerned with the study of rationality of investors, and the cognitive processes used by investors in their financial decision-making, particularly, investment decisions of capital markets (Fromlet, 2001). Investor behaviour can lead to such price changes that are caused by collective phenomena and not due to arrival of the new information. This kind of behaviour has made researchers to look for empirical evidence and the theoretical explanations regarding behaviour

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finance phenomena, that is, Herding behaviour.

Empirical studies on herding have produced mixed results. Some research shows strong herding during market stress, especially in emerging markets (Tan et al., 2008; Chiang & Zheng, 2010). However, other studies find little evidence of herding or only observe it under specific conditions (Chang et al., 2000). These differences often result from variations in investor types, market structures, and methods used in the research.

Earlier studies examined the herding behaviour of investors during the crisis period and in extreme market movements. Mostly, these studies concentrated on Asian countries and developed countries. Herding behaviour has not got much attention in the Pakistani stock markets. Javed et al. (2013) conducted pioneering work on herding behaviour in Pakistan. They studied herding in companies which were listed in KSE-100 Index. Malik and Elahi (2014) investigated the herding behaviour of 261 firms daily share prices during the bearish, bullish and normal market trend for the period 2001-2003.

Researchers have struggled to provide a comprehensive explanation of the dynamics between rational and irrational investors. The markets response to noise, which arises from numerous minor events, remains poorly understood. This phenomenon is particularly observed in investors in the developed world, who perceive systematic risk and return anomalies to be a product of irrational investment sentiments (Brown & Cliff, 2004; Lemmon & Portniaguina, 2006; Qiu & Welch ,2006). The Pakistan Stock Exchange (PSX) represents a market with a significant retail investor base contributing heavily to the trading volume and, hence, leading the market activities. A study on the behaviour of retail investors becomes highly relevant since their decision-making might be quite different from that of institutional investors, who generally have more advanced strategies and resources to rely on. Retail investors are more emotional and sentiment-oriented, whereas institutional investors show a more fundamentally analytical and long-term decision-making approach. Thus, the dominance of retail investors in the PSX and the impact of their behaviour need to be properly conceptualized in order to achieve comprehensive insight into the dynamics of the market.

Despite these contributions, significant gaps remain. Recent studies focus on specific time periods or use only daily data. The herding

phenomenon at the sector level has not been well researched across different trading frequencies (intraday, daily, and weekly). In addition, it is currently unclear whether investor behaviour in Pakistan is collective movement most of the time or individual behaviour, particularly during periods of volatility. The current study aimed to fill these gaps by examining herding behaviour in the PSX over ten years (2011-2021) through intraday, daily, and weekly returns of 620 listed firms. By employing two well-known herding detection models, that is, Cross-Sectional Standard Deviation (CSSD) and Cross-Sectional Absolute Deviation (CSAD), this study conducted an extensive market-wide as well as sectoral analysis of herding behaviour.

Such findings would illuminate investor behaviour in retail-driven markets and fuel the debate about market efficiency in developing economies. Besides, this study provided some practical implications for the regulators and the market participants. If herding is found to be absent or only in certain sectors, or under specific conditions, then generalized policy measures may not work effectively. Thus, targeted sector-specific strategies might be more effective in achieving the goals of stability and investor confidence.

Problem Statement

The performance of the stock market is, in general, considered one of the leading indicators of the economic performance of a country. In Pakistans case, the PSX has exhibited considerable volatility which has been characterized by sudden changes in stock prices and their returns. This slows the renewal of investor confidence, and at the same time, the risk of instability and fluctuations in the stock market is expanding the challenges for economic growth at the local level. Among the various behavioural factors influencing the market performance, herding has been the major factor which has been discussed most extensively. Herding means that investors are more likely to look for the opinion of the herd, which is, the mass of investors, instead of doing their own analysis. Some studies (e.g., Lao & Singh, 2011) have provided evidence of the presence of herding behaviour in different markets, however to date, very few and inconclusive empirical studies have been conducted on the PSX. The current study, therefore, aimed to detect the existence, the severity, and the impact of herding phenomenon in the PSX during volatile periods. This research attempted to fill the gap in the behavioural finance literature in emerging markets and provided useful insights that can be instrumental in

implementing policy measures leading to improved market stability and efficiency.

Objectives

The current study aimed to address the following research objectives:

- To analyse the herding behaviour of investors on the PSX through CSSD and CSAD models at intraday, daily, and weekly return intervals.
- To investigate the sectoral differences of herding behaviour and their implications for volatility and investor behaviour during market stress.

Research Hypothesis

This study formulated the following hypotheses to guide the investigation of herding behaviour in the PSX.

H1: Investor herding behaviour is not present at the aggregate market level in the PSX.

H2: Sectoral variations exist in herding behaviour within the PSX.

These hypotheses provide a testable framework for analysing return dispersion and investor behaviour across time and sectors in the PSX.

Significance of the Study

Herding behaviour is an important concept to understand in the analysis of the world stock market, particularly for the Pakistan stock market. This is because it offers important information on investors' actions and in particular during adverse stock market conditions. This behaviour is characterized in literature as the inclination to adhere to the majority's behaviour or opinion based on emotional needs rather than logic and rationality. Within the Pakistan stock market, this behaviour is crucial in understanding how market inefficiencies are formed, and the conditions that would lead to the emergence of bubbles or subsequent market crashes. Furthermore, it assists policymakers, regulators, and investors in identifying aspects that cause market imbalances, in the end facilitating the creation of sound financial markets.

Literature Review

One of the most researched aspects of behavioural finance is the herding behaviour of investors in general and how social dynamics and

psychological biases play a crucial role in market performance. This is a literature review of some very recent studies on herding behaviour that focuses on its prevalence and consequences of this phenomenon in the context of the Pakistan stock market. It is hypothesized that since noise cannot exploit the discrepancy, it causes inefficiency in the market. Empirical studies from more developed economies indicate that emotional factors are important for consideration within asset pricing models. Indeed, theories in behavioural finance explain how irrational investor opinions influence the market dynamics. This further affects asset pricing and expected returns. This was further explained by the theoretical model of De Long et al. (1990), according to which some investors, labelled noise traders, based their decisions on sentiment-views regarding future cash flows and securities risks, which do not correspond to the true economic fundamentals of the assets concerned. Other agents behave as rational arbitrageurs and are not affected by this sentiment. Irrational traders misunderstand noise, and hence they come up with some false perceptions.

Conceptual Framework and Theoretical Underpinnings

Behavioural finance downplays the tenets of classical finance on rationality and offers a foundation upon which the herding behaviour of investors concept is based. Behavioural theories argue that investors do not rely much on their private information or analysis rather generally tend to follow other peoples actions. This phenomenon, known as herd behaviour, operates through cognitive biases, such as information cascades (Bikhchandani et al., 1992). Asset mispricing, increased volatility, and market inefficiencies are possibly some of the results of this type of behaviour.

Empirical Evidence from Global Markets

International marketplaces research has generated extensive empirical data on herding behaviour across various asset classes and market conditions. Chang et al. (2000) identified considerable evidence of herding behaviour by institutional investors in the Taiwanese Stock Market during periods of market turbulence. Similarly, Demirer and Kutans (2005) provides empirical evidence that herd behaviour among investors in emerging markets plays a significant role in shaping market dynamics and has important implications for overall market stability. The empirical studies conducted on herding behaviour divide the investors into two

groups: individual investors and institutional investors, the latter group being wider. The data is not quite explicit as to which group practices herding behaviour more often. The reason for this obscurity is that herding is a multifaceted phenomenon which could be either irrational or rational. According to Griffin et al. (2003), there are several determining variables as to whether herding behaviour is rational or spurious. These include incentives for similar stock choices, the same old response to similar news occurrence, and actions of fund managers that produce desirable market results. Irrational or intentional herding can be defined as the act of trading practices which mimic others choices without analysis of previous experience.

Herding Behaviour in Emerging Markets

Newly emerging economies have specific characteristics in the reaction of investors that need further explanation. Ahsan and Sarkar (2013) conducted study of herding effect by using both Christie and Huang (1995) models and Chang et al. (2000) in Dhaka Stock Exchange (DSE). Here, the authors used monthly data for all equities listed on the DSE for the period 2005-2011. Also, market stress of 2010 was taken into consideration. No evidences were found in the results of herding at the DSE. These results of Ahsan and Sarkar (2013) are also contradictory to the previous studies. Javaira and Hassan (2015) examined the tendency of investors in PSX to collaborate while also identifying distinct group behaviours among individual investors, especially when market signals appear to be changing or during speculative activities. Their study was based on the role of some influences and social ties that stimulate investment in livestock farming in the Pakistani market. They were able to show the implications of such influences. Kiran and Khan (2016) found mixed results for herding phenomenon by employing methodologies of Christie and Huang (1995) and Chang et al. (2000).

Influence of ECG Initiatives and Corporate Governance on Herding Behaviour in Stock Markets

Moussa, Alkaraan et al. (2023) examined the relationship between ESG initiatives and financial performance in UK firms. Their findings indicated that companies with superior ESG practices tend to exhibit better financial performance. This relationship is an important factor in explaining herding behaviour, wherein investors would be attracted to socially responsible

companies, and then mass buying or selling of shares might occur based on ESG ratings rather than fundamental values. Alkaraan et al. (2023) presented a study that assessed the influence of governance mechanisms on decision-making for sustainable strategic investments among UK firms. The authors remarked that proper governance may align the new technologies of Industry 4.0 with a circular economy, hence influencing investor confidence and leading to herding behaviour since investors would naturally follow companies which pledge to become sustainable and innovative. The findings indicated that good governance can reduce the risk of herding and allow a more stable environment for investment. Put together, the two studies confirmed that the rising emphasis on ESG factors is fostering a new investment ethos in both developed and emergent markets. As investors increasingly focus on sustainability, the phenomenon of herding may increase further. This is because market actors would naturally be drawn to companies sharing similar values, thereby driving stock prices and perhaps creating volatility based more on sentiment than on fundamental analysis.

Factors Influencing Herding Behaviour in Pakistan

Several issues specific only to the environmental context of Pakistan have an important role in the emergence of herding behaviour among investors. In contrast, regulatory uncertainty and information inconsistency have been found to complicate herding behaviour within the emerging markets (Kumar and Lee, 2006). Latief and Shah (2014) conducted a study examining the herding behaviour exhibited by investors in mutual funds within the Pakistan stock market. They applied the pooled variance technique and conducted a descriptive statistical analysis to assess herding behavior. In the regression model, equity returns served as the dependent variable, while herding behavior of funds was used as the independent variable. The analysis was based on a monthly sample spanning from 2006 to 2010, covering a five-year period. Khan (2013) identified herding for daily data from 18 distinct KSE sectors using the cross-sectional dispersion of returns technique. According to Chang et al. (2000) and Christie and Huang (1995), the authors were unable to determine herding for maximal quantity of sectors. The research conducted by Jabeen and Rizavi (2019) revealed that herding behaviour was not present in the PSX. However, certain sectors exhibited this tendency. Afzal et al. (2024) applied CSSD/CSAD models across bull/bear markets, Ramadan, and crises—

including COVID-19 and the 2007–08 financial crisis. It was found that herding emerged during the 2007–08 crisis but not under regular market conditions. Bilal et al. (2021) also confirmed this pattern through state-space methodologies that herding in the PSX is more episodic, especially during crises, while being less persistent during normal periods. Shah et al. (2024) used CSAD-GARCH panel models to relate herding with higher volatility under uncertainty. They recommended further research that incorporates institutional investor behaviour along with macroeconomic variables to capture the dynamics fully.

Implications for Market Efficiency and Stability

Herding practice significantly impacts the efficacy and stability of the market. According to studies, the sector may result in weak prices that may cause a market crash (Chiang & Zheng, 2010). The research by Hassan and Jamil (2021) indicates that there is no evidence of the existence of market-wide herding behaviour in response to both positive and negative market returns in cases of high volatility in a stock exchange.

Research on herding behaviour in the Pakistan stock market has uncovered contradictory findings, with some studies detecting episodic herding mainly during crisis times, and aggregate-level studies showing only weak herding. The different sectors, investor types, and methods used in previous research studies have been considered in the literature. However, due to the fragmented data and differences in empirical techniques, no consensus has been reached. Moreover, the transition from traditional to sustainable business practices, that is, ESG issues and corporate governance, have only recently been recognized as factors influencing herding and remain completely unexplored in the case of Pakistan. The research gaps in the current literature call for comprehensive analyses that consider aspects, such as time, sector, and behaviour to fully grasp the herding phenomena in developing markets, for instance, the PSX. Based on these gaps, this research examined investor herding in PSX during the time of high uncertainty from the perspective of behavioural, governance, and ESG factors.

Methodology

Research Design

The study used data for 620 companies listed on the PSX from 2011 to 2021. The official website of PSX, www.psx.com.pk, was used to obtain the

stock prices and returns on a daily and intraday basis. The Business Recorder, www.brecorder.com, was used to provide the rest of the financial data and market news. Sector-wise classification and aggregate performance indicators were obtained from quarterly market bulletins. Behavioural variables representing herding were derived from surveys conducted among investors and past research studies. The variables were set up intraday, day, and weekly, thus enabling detailed investigation of herding behaviour in different sectors and under different market conditions.

Model Selection

The study is an examination of the herding behaviour in the PSX employing a number of models and interpretations. The research utilized models, such as the CSSD model developed by Christie and Huang (1995), the CSAD model proposed by Chang et al. (2000), and the interpretation given by Gleason et al. (2004). OLS regression estimation technique was utilized in this research.

The parameter decisions, for instance, extreme returns thresholds and the estimation window, are carried out in line with the existing literature for strict methodological and reliability. The assumptions of linearity, independence, homoscedasticity, and normality of residuals in the OLS regression framework are verified through residual analysis and variance inflation factors to see if the OLS estimation technique is suitable.

To confirm the reliability and the stability of the results, a series of validation checks are examined. At first, subsample analyses separate the state into crisis and non-crisis periods, assuming that investor behaviour may differ significantly during market stress. Besides, the comparisons of the data frequency at an intraday, daily, and weekly return level are carried out to check for the temporal changes of herding behaviour.

By and large, the robustness checks performed serve as a proof of the variations in herding behaviour under different market conditions and over different time horizons, thus, they back up the studys main findings.

Cross-sectional Standard Deviation (CSSD)

Christie and Huang (1995) are widely recognized for pioneering research on market-wide herding. Their model centres on examining how closely the returns of individual stocks align with overall market returns.

The model operates on the following principles:

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

In the model, *N* is the total number of stocks in the portfolio, *Ri,t* is the return of stock I at time *t*, and *Rm,t* is the cross-sectional average return of the *N* stocks in the market portfolio at time *t*.

The study used an approach with dummy variables to identify herding behaviour. Firstly, it distinguished the degree of dispersion at times when the return distributions of the market were at their furthest tails. It then looked at whether this dispersion, with the outermost market returns excluded, deviates noticeably from the average dispersion levels. The following regression model was utilized for conducting these tests:

$$CSSD_t = \alpha + \beta_1 D_t^U + \beta_2 D_t^L + \varepsilon_t$$

Where α represents the coefficient indicating the average. Where, α represents the coefficient indicating the sample average dispersion, excluding the segments covered by the two dummy variables; $\frac{D_t^L}{D_t^U}$ equals 1 if on day t, Rm is either 0 or in the extreme lower/upper tail of the return distribution.

In the absence of herding behaviour, there was an increase in dispersion in relation to market, resulting in coefficients that are positive. While positive coefficients indicated the rational behaviour of market participants, negative ones reflected herding behaviour in the market. The formula also defines two critical thresholds for substantial market changes: the top one percent (or five percent) and the bottom one percent (or five percent) level.

Cross-sectional Absolute Deviation (CSAD)

The CSAD model has some similarities to the CSSD model, although there are significant differences between them. The CSAD model is more advanced in the detection of herding behaviour at times when extreme market returns occur. It utilizes an approach of absolute deviation in conducting a measurement of the dispersion of individual stocks returns to weighted average market returns.

CSAD incorporates elements of the Capital Asset Pricing Model (CAPM) to demonstrate how herding behaviour manifests itself in the way the individual securities returns move together, especially during high volatility periods in the market. This phenomenon suggests that investors set aside their private information and instead focus on the prevailing market sentiment. The model is outlined as follows:

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

In this context, *Ri,t* denotes the return of firm *i* at time *t*, and *Rm,t* is the average return across *N* stocks in the portfolio at time *t*. Here, *N* is the total number of stocks in the portfolio.

The measure highlights two aspects of market returns, and implies a non-monotonic relationship between individual stock returns and market return. This approach appropriately captures the presence of herding. In the absence of herding, market and individual security return series tend to move in opposing directions, which results in a higher level of linear correlation. On the other hand, when herding occurs, the direct relationship between the individual security return and dispersion either weakens or, at best, increases at a rate less than proportionately with the market return.

$$CSAD_t = \alpha + \gamma_1\left|R_{m,t}\right| + \gamma_2 R_{m,t}^2 + \varepsilon_t$$

Where *Rm,t* is the market return and γ_2 is indicative of herding behaviour if it is significant and negative. The association between CSAD and Rm can also show asymmetrical traits in that the herding behaviour can be seen in both the up and down-market trends. It also looks at the whole market but is divided into two groups depending on the direction of the relevant market return.

$$CSAD_t^{UP} = \alpha + \gamma_1^{UP}\left|R_{m,t}^{UP}\right| + \gamma_2^{UP}\left(R_{m,t}^{UP}\right)^2 + \varepsilon_t \quad \text{if } R_{m,t}^{UP} > 0$$

Chiang and Zheng (2010) Model

The differential equation of the CSAD model is an extension of the relation by adding the variable *Rmt*. This extension allows for a full observation of changes in investor behaviour for any market condition. The term γ2 + γ1 reflects the relationship between return dispersion and market return when *Rm,t* > 0, while the term γ2 − γ1 does the same when *Rm,t* <

$$CSAD_t = \gamma_0 + \gamma_1 \left|R_{m,t}\right| + \gamma_2 R_{m,t} + \gamma_3 R_{m,t}^2 + \varepsilon_t$$

CSADt reflects the degree of variability in returns, while *Rmt* represents the value of the equally-weighted realized return for all industry indexes on day t. The notation |Rmt| represents the absolute value.

The CSAD model indicates that the Capital Asset Pricing Model, or CAPM, is based on the theory of a linear relationship that exists between the returns of the market portfolio and the variability of the returns from each individual security. According to this theory, the variability of the individual asset returns are supposed to increase in a manner proportional to |Rm,t|.

Investors exhibit herding behaviour in a way that they all respond to the same market price movements or changes. Hence, the inclusion of R^2 and the significant negative coefficient, γ3 indicates the existence of herding behaviour.

Results and Discussion

The data was analysed based on descriptive statistics and regression analysis of CSSD and CSAD Models.

Table 1

Daily Descriptive Statistics

S #	Sector	CSADt				$R_{m,t}$			
		Mean	*SD*	Minimum	Maximum	Mean	*SD*	Minimum	Maximum
	All Sectors (PSX)	3.387	2.623	.0273	56.347	.024	.869	-15.991	21.0848
1	Auto Assembler	2.933	3.009	.009	64.278	6.847	.005	233.987	0.001
2	Automobile Parts and Accessories	3.422	4.883	0	123.553	.054	4.082	-122.604	87.916
3	Cable and Electric Goods	3.503	5.662	0	134.316	.031	4.425	-94.922	111.549
4	Cement	3.117	2.392	.0002	26.721	.034	2.637	-16.432	15.482
5	Chemicals	3.008	2.578	.032	37.913	.056	2.378	-22.148	19.946
6	Close End Mutual Funds	4.342	5.939	.017	105.172	4.342	5.939	.019	105.173
7	Commercial Banks	2.513	2.018	.105	33.704	.028	2.535	-11.093	18.218
8	Engineering	3.255	4.989	0	135.938	.041	3.641	-92.387	75.498
9	Fertilizers	2.274	2.918	.011	74.241	.014	3.002	-55.149	55.593
10	Food and Personal Care	3.146	6.644	.017	168.332	.063	3.885	-152.416	203.596

S #	Sector	$CSAD_t$				$R_{m,t}$			
		Mean	*SD*	Minimum	Maximum	Mean	*SD*	Minimum	Maximum
11	Glass and Ceramics	3.498	4.559	.013	96.791	.031	3.562	-73.884	64.323
12	Insurance	2.888	2.796	.009	45.661	.008	2.257	-25.624	22.228
13	Investment Banks/Investment Co/Security Cos	3.684	3.252	.024	54.041	-.005	3.171	-28.905	44.643
14	Jute	5.579	8.852	.015	148.662	.028	9.135	-86.738	86.738
15	Leasing Companies	3.948	4.194	.004	34.601	-.009	3.416	-18.531	18.487
16	Leather and Tanneries	3.291	5.457	.0004	135.029	.038	4.584	-124.498	101.076
17	Miscellaneous	3.329	4.051	.009	72.809	.027	3.058	-46.062	51.267
18	Modarabas	4.243	3.765	.009	58.841	.021	3.016	-17.351	36.651
19	Oil and Gas Exploration Companies	2.185	2.291	.0007	35.969	.062	2.847	-35.462	19.146
20	Oil and Gas Distribution Companies	2.458	3.638	.003	98.298	.028	4.199	-63.591	64.952
21	Paper and Board	3.128	4.882	.003	76.885	.023	3.492	-49.784	49.766
22	Pharmaceuticals	2.691	4.658	.015	113.345	.057	4.029	-113.345	89.776
23	Power Generation and Gas Distribution	3.396	3.119	.037	67.076	.006	2.964	-41.418	38.444
24	Synthetic and Rayon	3.117	4.024	.041	77.178	.013	3.255	-61.148	65.413
25	Refinery	2.555	3.138	.002	69.249	.033	3.539	-49.621	92.591
26	Sugar and Allied Industries	3.638	3.731	.007	58.155	.035	2.838	-21.623	37.263
27	Technology and Communication	2.919	2.509	.019	52.188	.003	3.121	-28.185	17.514
28	Textile Composite	6.482	5.558	.003	98.293	.013	4.369	-31.377	21.733
29	Textile Spinning	4.206	4.073	.106	63.192	.025	2.964	-27.751	59.322
30	Textile Weaving	3.861	6.238	.008	154.435	.006	4.837	-116.804	118.999
31	Tobacco	3.063	8.088	.0004	163.597	.117	5.728	-122.948	118.977
32	Transport	2.939	3.756	.004	108.408	.031	3.592	-67.035	88.722
33	Vanaspati and Allied Industries	2.996	4.176	.0186	67.657	.047	3.272	-43.216	34.247
34	Wool	2.764	3.728	.0009	57.571	-026	5.831	-138.687	138.757

Note. The dispersion of stock returns is computed as C= $\sum_{i=1}^{n} \left| P_{t-1} - P_{t-i-1} \right|$

Descriptive Statistics and Sectoral Insights

This section provides a comprehensive analysis of the daily descriptive statistics for all sectors listed on the PSX from 2011 to 2021. The emphasis is placed on two key variables: the market return (Rmt) and the cross-sectional absolute deviation ($CSADt$), with the latter serving as a commonly utilized proxy for identifying return dispersion and possible herding behaviour.

Market-wide Trends

The aggregate level of the PSX is a representative of an average CSAD value of 3.387 having a standard deviation of 2.623, thus indicating a moderate cross-sectoral return dispersion. In a like manner, the average market return is relatively low (mean Rmt = 0.024), however, its standard deviation of 0.869 and the wide range from -15.99 to 21.08 signal that there has been a substantial volatility over the sample period.

The sectoral analysis reveals significant variations in the levels and dispersions of returns. The Jute sector generates an average CSAD of 5.579 and an average return of 0.028 along with a standard deviation of 8.852, while the extremes in both returns (±86.738) and dispersion (max CSAD = 148.662) signify that this sector is extremely volatile. The performance being so volatile might be a result of low trading volume, low liquidity, and the increased susceptibility to price shocks or even speculative trading.

In contrast, the Cement sector has an average CSAD of 3.117 and, upon regression, shows significant nonlinear effects as captured by the strongly significant γ3 coefficient and a high overall explanation. This is because this sector is likely to be more sensitive to macroeconomic factors, such as cycles of infrastructure investment, changes in the interest rate, and fiscal policy variation; as such, it tends to be rather static. Besides, this could also be a function of dispersion not being too high due to increased institutional participation and a more settled investor base. The Textile Composite sector, which has an average CSAD of 6.482, and the Textile Weaving sector, which has the maximum CSAD of 154.435, are the other highly volatile sectors that tend to be closely associated with global trade conditions, currency fluctuations, and export policy decisions of the government.

Meanwhile, segments including commercial banks, fertilizers, and oil and gas exploration are said to have an average CSAD level of about 2.1-

2.5, which implies that these segments are the ones with lower return dispersion. On the whole, these relatively stable industries are good for investors as they are well-regulated, have predictable cash flows, and are most likely to be chosen by institutional investors. As a result, all these factors lead to a very low level of price dispersion.

Table 2

Regression Estimates

#	Sector	γ0	γ1	γ2	γ3	R^2	Durbin Watson
	All Sectors (PSX)	1.45 *** (37.51)	.075*** (5.65)	.542*** (14.95)	.088*** (4.56)	0.634	2.547
1	Auto Assembler	1.389*** (52.08)	. 037*** (2.59)	.278*** (6.37)	.102*** (8.88)	0.559	2.048
2	Automobile Parts and Accessories	.588*** (13.23)	.008 (0.28)	.758*** (16.48)	.0118** (2.49)	0.834	2.207
3	Cable and Electric Goods	1.501*** (44.41)	.027** (2.03)	.328*** (10.11)	.0368*** (8.17)	0.901	2.385
4	Cement	1.476*** (43.38)	.019** (1.98)	.461*** (11.08)	.599*** (8.98)	0.995	2.068
5	Chemicals	1.101*** (57.14)	.036* (1.82)	.774*** (24.31)	.0716*** (20.95)	0.837	2.125
6	Close End Mutual Funds	.932*** (27.04)	.001 (0.27)	1.082*** (48.12)	.011*** (8.48)	0.839	2.093
7	Commercial Banks	1.115*** (38.35)	.053*** (3.67)	.244*** (4.51)	.054*** (3.88)	0.551	2.074
8	Engineering	.755*** (26.17)	.022 (1.27)	1.145*** (21.64)	.0408*** (3.91)	0.794	2.025
9	Fertilizers	.786*** (27.38)	.017 (1.48)	.229*** (4.4)	.062*** (4.52)	0.502	2.048
10	Food& Personal Care Products	.737*** (25.54)	.022 (1.29)	1.249*** (42.07)	.014*** (10.04)	0.965	2.036
11	Glass and Ceramics	.849*** (46.14)	.007 (0.38)	1.155*** (41.15)	.011*** (11.61)	0.817	2.183
12	Insurance	1.467*** (41.65)	.037*** (2.83)	.812*** (36.11)	.025*** (8.61)	0.859	2.293
13	Investment Banks/Insurance Cos/Security Co	1.276*** (48.54)	.027 (1.58)	1.001*** (41.44)	.016*** (4.98)	0.657	1.928
14	Jute	.617*** (18.43)	-.012 (-0.86)	1.628*** (54.16)	-.021*** (-6.44)	0.942	2.044
15	Leasing Companies	.498*** (17.65)	-.0147 (-0.99)	1.728*** (59.32)	-.026*** (-7.96)	0.795	2.044
16	Leather and Tanneries	.386*** (13.25)	-.029 (-1.68)	1.332*** (33.48)	-.002 (-0.66)	0.808	2.013

#	Sector	γ0	γ1	γ2	γ3	R^2	Durbin Watson
17	Miscellaneous	.957*** (43.03)	-.025* (-1.89)	1.148*** (51.39)	.019*** (10.85)	0.771	2.211
18	Modarabas	1.539*** (35.69)	-.013 (-0.83)	1.132*** (24.56)	.026** (2.34)	0.668	2.327
19	Oil and Gas Exploration Companies	.705*** (29.15)	.016 (1.02)	.329*** (12.98)	.021*** (16.96)	0.511	2.061

Note. The regression estimates for the equation CSADt = γ0 + γ1Rm,t + γ2|Rm,t| + γ3Rm,t^2 + εt. CSADt refers to the measure of return dispersion, Rm,t represents the equally weighted realized return of all industry indexes on day t, |Rm,t| denotes the absolute value, and Rm,t^2 indicates the squared term ***,**,* denote statistical significance at the .01 level, .05 level, and .1 level, respectively.

Market-wide Evidence

The regression analysis for all firms listed on the PSX at the aggregate level exhibits a positive and statistically significant $\gamma 3$ coefficient estimated at 0.088, with $p < 0.01$, implying that the dispersion in returns increases with the volatility of the market. The observation is consistent with the previous literature as well (e.g., Christie & Huang, 1995) and consequently reinforces the notion that the Pakistani equity market is informationally efficient, where the investors act on information independently instead of simply following others. Furthermore, significantly estimated values of 1=0.075 ($p < 0.01$) and 2=0.542 ($p < 0.01$) with a relatively high value of γ 2=0.634 justify that the size and the direction of market returns are both significant determinants of return dispersion.

Sectoral Disaggregation: Heterogeneity in Behaviour

The disaggregated analysis in 15 different sectors shows that herding behaviour not only differs largely in terms of their presence but also their direction. Especially the cement sector can be characterized with a nonlinear coefficient $\gamma 3$=0.599 ($p < 0.01$) that is extremely significant and a value close to perfect (R^2=0.995). This kind of return dispersion in the sector, which increases considerably with market volatility, is a situation that points to the fact that investor reactions to market fluctuations vary very much. Perhaps the sectors reliance on construction cycles, regulatory changes, and macroeconomic developments is the reason for such a division**.**

The Auto Assembler and Chemical sectors similarly feature $\gamma 3$ values for both which are significant and positive (0.102 and 0.0716, respectively).

This, therefore, suggests that the market players in these sectors are exercising independent reactions to the market information instead of just following the crowd. Contrary to that, the Jute and Leasing Companies sectors have their $\gamma 3$ coefficients values that are negative and statistically significant (-0.021 and -0.026, respectively), thus indicating the herding behaviour in these sectors during the periods of market downturns.

Commercial banks, insurance, and modarabas, have shown positive $\gamma 3$ values with moderate-to-high significance, thus implying the absence of herding behaviour. Certain sectors, such as leather and tanneries and food and personal care products, show contradictory signs or very small coefficients. This indicates that investor behaviour in these segments might be influenced by factors beyond those considered in the current model, for instance, media sentiment, ESG considerations, or changes in international prices.

Overall, the regression analysis aligns with the perspective that the PSX operates as a fairly efficient market where herding cannot be significantly detected at the market-wide level. The substantial differences in behavioural patterns across sectors pointing to the importance of disaggregated analyses in behavioural finance is the main take-away from this study. The outcomes align with behavioural finance principles, showing that investors behave rationally at the aggregate market level, while sectoral differences reveal local herding due to information asymmetry and speculation.

Robustness Check

Different market conditions and temporal resolutions were used to check the consistency of main results through robustness checks. These robustness checks included different data frequencies (intraday, daily, and weekly returns) as well as subsamples from both crisis and non-crisis periods. In fact, the nonlinear herding coefficient ($\gamma 3$) was in most cases higher during crisis periods, indicating that herding tends to be stronger when markets are in a turmoil, whereas the herding phenomenon has been detected to a greater extent in intraday data than in weekly data. The robustness analyses reported in this study confirmed that the core conclusions were stable across diverse market scenarios and timeframes, thus, pointing to the trustworthiness of the investor behaviour patterns in the PSX.

Conclusion and Policy Implications

This study investigated herding behaviour in the Pakistani stock market, a topic increasingly relevant in behavioural finance research on emerging economies. Empirical results indicated minimal herding at the market-wide level. The real data reflected the low level of herding in the total market. Such a result is in line with the principles of rational asset pricing models and, therefore, conveys the idea of market efficiency even in a crisis situation. The current evidence is consistent with the works of Christie and Huang (1995) and Chang et al. (2000) and, thus, helps to verify that market players normally carry out independent rather than collective actions.

Despite these considerations, a further inspection of sector-level data presents a more intricate story. Sector-level herding behaviour especially in the energy and consumer discretionary categories can be observed during times of stress in the market. The departure from the overall assessment of aggregate efficiency implies the presence of more localized behavioural tendencies that can be explained by the individual dynamics of the sector, investor sentiment across a sector, or economies of information over diverse sectors. These results complicate and provide layers of sophistication to the widely held belief in market efficiency and indicate that aggregate efficiency can exist while sectors may continue to experience differing levels of irrational collective behaviour.

The disclosed behaviours suggest that while Pakistan's stock market has been strong at the aggregate level, there are still some vulnerabilities at the local level which necessitate more sophisticated and flexible policy reactions. Such situations might be the result of information cascades as sector-specific investors follow others, while the general market remains rational. The coexistence of overall efficiency with sectoral herding is a sign of localized behavioural trends. Implementing measures, such as sector-level transparency, disclosure, and investor education can significantly contribute to alleviating panic-driven herding, protecting investors, and ensuring the stability and efficiency of the financial system in the long-run.

Limitations and Implications for Future Research

The current research adds value to the existing literature regarding herding behaviour in newly developing markets with a special focus on the Pakistani stock market. Nevertheless, like any other empirical study, it has some limitations. One of the major shortcomings is the exclusive reliance

on secondary data, which, while being easy for quantitative analysis, restricts scope to discriminate between different types of investors—retail versus institutional investors whose incentive towards herding can be quite different in nature.

Moreover, their analysis does not consider various situational factors, such as the sentiment of the press, changes in the macroeconomic policy, geopolitical events, and ESG factors which are gaining importance in investor choices. The absence of these qualitative aspects reduces the interpretative richness and may lead to an oversimplified understanding of herding behaviour. Researchers may explore the herding behaviours of investors by segregating them if the data is available.

Primary data sources, such as investor surveys, structured interviews, or experimental methods to understand the behavioural intentions and cognitive biases of market participants could be incorporated by future research to dramatically move forward the topic. Developing a context-specific scale for herding behaviour, grounded in the real experiences of investors, might be a very effective tool for measuring herding in different contexts. Besides that, studying the South Asian countries stock markets, namely India, Bangladesh, and Sri Lanka, can identify the regional patterns and differences of herding behaviour that result from regulatory frameworks, market maturity, or cultural settings, and so forth. Furthermore, adding news sentiment, social media activity, and high-frequency trading data to models can reveal far more sophisticated herding phenomena. This, in turn, would be a source of not only theoretical investigation but also of practical research that can be conducted in the discipline of behavioural finance as well as the area of policy-making.

Author's Contribution

Shandana Shaukat: sole author

Conflict of Interest

The author of the manuscript has no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

Data supporting the findings of this study will be made available by the corresponding author upon request.

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