# Herding behaviour of stock market in emerging country: insight from Pakistan

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**Abstract:** The purpose of this research is to investigate herding behaviour on the Pakistani Stock Exchange. It has been claimed in previous research that herding behaviour is driven by basic information, which promotes swift price changes in response to new information and leads to efficient markets. In this study, daily market data from 2011 to 2020 was used. The cross-sectional absolute deviation (CSAD) approach was used. This paper makes a progressive contribution by investigating the herding behaviour which includes the herding of companies toward the marketplace. Additionally, we studied herding in five quintiles which are arranged according to the firm size. This study found that investors in large companies tend to keep a closer eye on the market than investors in smaller companies. This research may assist regulators in conducting a thorough investigation of market abnormalities, which will result in more efficient market processing.

**Biographical notes:** Mahnoor Fatima has recently passed her MCom (3.5 years) (which is equivalent to MPhil) from the Hailey College of Commerce, University of the Punjab, Lahore, Pakistan. Her specialisation is in finance. She has participated in many international conferences and presented her papers.

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Muhammad Sabeeh Iqbal is working as an Assistant Professor at the Hailey College of Commerce, University of the Punjab. He received PhD in Business Administration from the Bilkent University, Turkey. The role of financial institutions' herding behaviour in the price discovery process is the focus of his research work. He identified new herding strategies of institutions and documented their implications for stock prices. He received the 'Excellence in Research Award' from the Bilkent University and the 'Best Paper Award' from the Eurasian Business and Economics Society (EBES).

# 1    Introduction

The stock market has been widely regarded as a gauge of the health of the economy. To put it another way, a steadily rising stock market typically indicates that investors are confident in economic growth's prospects. Despite this theoretical connection to reality, research demonstrates that market investment choices are influenced by a variety of non-fundamental and non-rational factors. Investors' tendency to follow other investors' trading decisions rather than making their own, private, or atomistic judgments is a big abnormality and this phenomenon is called herding. Keynes (2010) was the first researcher to inspire research on herding behaviour, he noted the fascination of hesitation and mimicking the crowd. Keynes's views have important implications for the financial markets, as the herding tendency has been demonstrated to feed speculation and finally lead to bubbles that burst in the stock market (Mand and Sifat, 2021).

Herding is an example of a "parallel activity that happens when investors imitate and follow other investors". This might lead to a large group of investors engaging in similar transactions at the same time (Nofsinger and Sias, 1999). For Avery and Zemsky (1998), herding behaviour is defined as market players trading in the direction of the preceding transaction, disregarding their judgments (Ansari et al., 2020). This concept raises questions about the efficiency of the market hypothesis and rational asset pricing model, as well as about the validity of other economic models (Nasir et al., 2021). Other researchers believe that herding behaviour may disrupt the market, causing price inefficiencies by shifting assets away from their fundamental values, which results in financial system instability (Demirer and Kutan, 2006; Bikhchandani and Sharma, 2000; Hott, 2009). While some researchers believe prices respond more quickly to new information, resulting in a more efficient market (Hirshleifer and Teoh, 2003; Hirshleifer et al., 1994).

The concept of market efficiency indicates that the prices in a stock market are positive if they are based on all the information that is available at that time. This means that traders can make assumptions about how prices will change in the future (Bashir et al., 2020). The market efficiency hypothesis has been questioned by both theorists and practitioners, and its shortcomings have been recognised in the literature (Summers, 1986). As traditional financial models have many shortcomings due to which behavioural

finance theory has been developed. A common argument for high market volatility and stock price deviations from fundamental values is now herding behaviour's prevalence. An alternative interpretation would be that the human element is taken into account in this method, which makes an effort to connect market movements to an individual's psychological state.

Asset price bubbles are also caused by herding. According to Shiller and Pound (1986), speculative behaviour might result from blindly following the herding behaviour. The fact is that it would help them achieve big profits and may encourage investors to invest in the same direction. However, the majority of investors are uninformed of the risks associated with such sorts of investments, and as a result, they end up taking a risk that they would never contemplate doing if they were aware of the risks (Khan et al., 2020). One or more players begin to believe that the market's current trend cannot continue and hence begin to flip their outlook from optimistic to pessimistic (Chen and Pelger, 2013; Minsky, 1983). An increase in herding behaviour leads to an increase in the size of the bubble, which causes prices to rise even faster (Rannou, 2010). This makes herding behaviour a significant research area.

Herding may occur in an emerging country such as Pakistan due to several factors including an immature financial and regulatory environment, extremely volatile foreign money flows, a lack of skilled small investors, and a variety of other factors. The regulatory environment in emerging countries may not be as mature and robust as that of developed countries, leading to higher uncertainty and risk perception among investors. Understanding these differences can help policymakers, investors, and market participants in emerging countries like Pakistan to identify potential challenges and opportunities, and to develop strategies to foster more stable and efficient financial markets. Studying the herding behaviour in the stock market of an emerging country like Pakistan can provide valuable insights into the unique factors influencing investor decision-making and market dynamics in these transitioning economies. Emerging markets may suffer from information asymmetry, where certain information is not readily available or transparent. This can make it more challenging for investors to accurately assess the value of stocks and make informed investment decisions. Emerging markets often face liquidity constraints, meaning that trading volumes and market depth may be lower compared to developed markets. Emerging markets, including Pakistan, tend to exhibit higher levels of volatility in their stock markets compared to developed countries

The majority of existing research has been conducted in Western nations, with a few exceptions in Asian markets. Herding behaviour on Pakistan's stock markets has received limited attention. This research makes a number of contributions to the literature. Firstly, this study addresses that vacuum by analysing herding behaviour in the Pakistan stock market using a cross-sectional absolute deviation (CSAD) approach. Previous studies looked at herd behaviour both in advanced and developing markets. Herding, on the other hand, is a feature of the emerging market, when information asymmetry is high. Furthermore, the growing tendencies of these marketplaces give substantial insight into herding effects. Herding conduct has been an attractive issue in the literature because it magnifies volatility, destabilises financial markets, and enhances the financial system's fragility because the appearance of subjective expectations about the future development of risk and profitability may impact investment choices. No other research has such a broad examination of PSX-listed companies. In emerging markets, there have been very few studies that analyse the impact of herd behaviour (Jose et al., 2018). To fill the

knowledge, gap this research has studied herd behaviour in Pakistan's stock market by using the CSAD model.

Secondly, previous research has not distinguished between the herd behaviour of small and large firms listed on the Pakistan Stock Exchange (PSX). Thirdly, Individual perspectives need in-depth examinations of investors' trading behaviours to comprehend the inclination of people to follow one another in their investments. The purpose of this research is to determine if investors limit themselves to herding within their size class by making five quintiles sorted by firm size. In this study, Firm-sized-based quintiles are made to identify herding behaviour in Pakistan's stock market. To determine whether the herding behaviour is different between small and large firms, we perform a thorough investigation by making 5 quintiles, quintile 1 is the smallest quintile, and quintile 5 is the largest according to their firm size. Due to the lack of interest of institutional investors and analysts, and the difficulty of illiquidity, small companies are frequently overlooked. As a result, we believe that their herding behaviour is likely to be distinct from that of larger firms.

## 2    Literature review

The practice of herding has evolved into a psychological phenomenon in today's society. In every area of our life, we have a tendency to follow the crowd and do what everyone else is doing, which limits our ability to make independent decisions. When investors follow the behaviour of other investors, a phenomenon known as herding occurs in the financial markets. Financial markets and financial institutions become more unstable and volatile when herding occurs (Bikhchandani and Sharma, 2000; Jansen et al., 1998). Empirical research is more important than theoretical evidence when it comes to understanding herding. Herding has been getting a lot of attention in the last few decades. It has been seen as a major factor in growing volatility and destabilising financial markets (Kremer and Neutz, 2013). One way to describe the phenomenon of herding is that individuals suppress their ideas and discard their expertise to mimic the actions of other investors. Herding behaviour is either irrational or rational. Investors' judgments are often impacted by psychological elements, leading to the mistaken belief that they should blindly follow their peers. By the principal-agent interaction, the rational viewpoint is driven by an investor's expectation of gaining informational advantages (Banerjee, 1992) and reputational concerns (Scharfstein and Stein, 1990).

According to Chang et al. (2000), the study of herding behaviour is necessary because, in the financial markets, the conduct of investors has a substantial impact on the pricing of stocks. This has been linked to market defects that the asset pricing model is unable to resolve, such as considerable market volatility and market disruption (Naqvi et al., 2019). Research has focused mostly on herding in developed markets. If you're looking for herding in the stock market, you may use a variety of different methods. Christie and Huang's (1995) CH model or Chang et al. (2000) CCK model is the most often used technique.

Christie and Huang (1995) developed a cross-sectional standard deviation (CSSD) model that is based on the link between the variance of particular stock returns and the fluctuation of the market average return. Shareholders' decision-making behaviour is influenced by market circumstances. The yield distribution increases when the precise return is increased, according to rational asset pricing models. This is founded on the

premise that investors base their investing decisions on a wide range of personal data. Moreover, there are several criticisms of the Christie and Huang (1995) model. There has been a major criticism that the CCSD model has endpoints of 1% and 5% for the top and bottom tails of the yield dispersion. However, from the point of view of the shareholder, what is considered to be extreme is not logical. Secondly, herding may occur at any point in the distribution process, even if it is more pronounced while the market is down. The proportionality problem in Christie and Huang's model is further emphasised in Chang et al.'s (2000) model CCK (1995). Christie and Huang's (1995) CH model has difficulty with a linearity that was highlighted by Chang et al. (2000) model.

Based on Christie and Huang's study, Chang et al. (2000) established a nonlinear relationship between stock return dispersion and total market return. By using CSADs, the dispersion was determined (CSAD). They studied the herding behaviour of investors in several worldwide markets, including the USA, Japan, South Korea, Taiwan, and Hong Kong. They found that herding behaviour, which is measured by dispersion, had a higher coefficient in the rising market compared to the decreasing market in all five markets. They have also looked at the behaviour of investors herding in advanced emerging market countries. It was further argued by them that the existence of herding behaviour in developing markets is mostly due to a scarcity of information in these markets. Herding was not present in developed markets like the USA and Hong Kong, but it was found in developing markets like South Korea and Taiwan. It was agreed upon by Froot et al. (1992) that the inclusion of short-term traders might lead to inefficiencies in the information flow. It has been hypothesised that differences in herding behaviour may be caused by a high amount of government intervention in emerging financial markets.

Herd behaviour on the Italian Stock Exchange was examined by Caparrelli et al. (2004) between 1998 and 2001 using the technique suggested by Chang et al. (2000), and they identified variations in the patterns of herding behaviour. Herding levels were also investigated to differentiate between fictitious and real herding. The findings confirmed Christie and Huang's (1995) hypothesis that herding behaviour is common under difficult market conditions.

The CSAD was used to indicate herd behaviours in the Japanese stock market during periods of high market volatility (Cajueiro and Tabak, 2009). On the other hand, using the same approach, Wong and Kok (2009) found no evidence of herd behaviour in Bursa Malaysia. There is a large firm herding during rising market trends, whereas small firms are herding during falling market trends. Kallinterakis et al. (2010) found no evidence of a herd on the Banja Luca Stock Exchange.

Although the majority of the work on herding behaviour is oriented toward developed and emerging countries. Limited research has been conducted on herding behaviour in Pakistan, and inconsistent herding results have been seen in the PSX. Javaira and Hassan (2015), as well as Khan and Abbas (2013), use CSSD and CSAD measures to examine herding in the PSX, and find that there is no herding in the Karachi stock market (KSE). Data from 2002 to 2007 were utilised on a daily and monthly basis. Malik and Elahi (2014), on the other hand, revealed no herding effects including both upward and downward markets on the Karachi Stock Exchange. However, Shah et al. (2017) discovered, using the CH approach, it was discovered that individual companies do not show herding, when sorted by size large organisations do show herding behaviour in extreme market fluctuations. This result is congruent with the findings of Zafar and

Hassan (2016), which discovered substantial evidence of herding during extreme market swings using both CSSD and CSAD models.

Khan and Rizwan (2018) used daily stock prices, CSSD, and CSAD measurements to analyse herd behaviour in 18 PSX sectors. CSSD showed no symptoms of herding, but CSAD had herding impacts within only three sectors. Furthermore, Yousaf et al. (2018) and Javed et al. (2013) examined herding tendency in the PSX in different market circumstances. They also applied CSSD and CSAD measurements and found no evidence of herding effects in the overall timeframe but did find it during the 2005–2007 crisis periods. Zhaohui et al. (2019) claimed that there is deliberate herding behaviour on the Pakistan stock market, citing sector-wise herding observed in 2016.

Even though many scholars have researched the effectiveness of the PSX, as with herding behaviour, contradictory findings have been observed. For example, Hameed and Ashraf (2006) discovered that Pakistan's stock exchange would be ineffective when investigating the weak form of efficiency. Similarly, Asif et al. (2015) found PSX inefficient after studying market efficiency over ten years using both monthly and daily data. Qasim et al. (2019) used a quantitative method to investigate the influence of herd behaviour and overconfidence bias on investor decision-making in Pakistan. Investor decisions were highly impacted by herd behaviour and overconfidence bias. Furthermore, Javed et al. (2013) suggested that "since behavioural biases are a short-term phenomenon, a more complete it analysis with a larger sample size or every day or week observation may provide any more indication of herding behaviour in KSE." Similarly, Javaira and Hassan (2015) said that "in the future, research may be undertaken using stock market returns portfolios depending on market capitalisation or sector-wise portfolio yields from the KSE-100 index." Shah et al. (2017) made the same suggestions, stating that "future studies may evaluate herding behaviour utilising weekly or monthly returns." As a result, the present study aims to add to the existing research by aiming to give novel insights into herd behaviour and stock returns. Jabeen and Rizavi (2019) used Chiang and Zheng's (2010) herd behaviour technique to evaluate herd behaviour in PSX and its connected industries. PSX did not expose the presence of herding in most of the studies.

## 3    Related theory

### 3.1    Behavioural finance

Behavioural finance is a subset of behavioural economics. It is mostly concerned with the investor's mindset and how he or she views the stock market. Investors are constantly on the lookout for projects that provide the greatest returns with the fewest risks. As a result, behavioural finance also discusses this kind of investor psychology. In the context of behavioural finance, herding refers to the tendency of investors to imitate the pattern of similar peers. Investors' decision-making is often explained by the herding tendency. Investors' willingness to follow or repeat other investors' behaviour has a huge impact on financial markets. Investors that prefer to herd are said to ignore their private knowledge, which in turn causes prices to be placed in a position that is inconsistent with the underlying worth of the stock. This might lead to a volatile market (Balcilar et al., 2013).

Behavioural finance is a field of study that combines elements of psychology and economics to understand and explain how individuals and markets make financial decisions. Behavioural finance recognises that investors often deviate from rationality

and are influenced by psychological biases, emotions, and social factors. In the context of the PSX, behavioural finance theory helps us understand why herding behaviour occurs among investors. Behavioural finance theory suggests that herding behaviour can arise due to information cascades. One of the key hypotheses used to measure herding behaviour is the information cascades hypothesis. According to this hypothesis, individuals observe the actions or decisions of others and use that information as a signal to guide their own behaviour, even if they possess private information that suggests a different course of action. As more people follow the observed behaviour, an 'information cascade' is formed, where subsequent individuals base their decisions primarily on the actions of others rather than on their private information.

In the context of the PSX, when investors observe others buying or selling stocks, they may perceive it as new information and assume that the collective actions of the crowd are based on superior knowledge. As a result, they may imitate the behaviour of others without conducting their own analysis. Understanding this concept helps explain the prevalence of herding behaviour in the PSX. Behavioural finance theory also highlights the role of risk perception and loss aversion in driving herding behaviour. Investors may fear being left behind or missing out on potential gains, leading them to join the herd. Understanding these behavioural biases helps explain why investors in the PSX may exhibit herding behaviour during times of market uncertainty or volatility. By incorporating behavioural finance theory into the study objective, researchers can gain a deeper understanding of the underlying psychological factors that drive herding behaviour in the PSX. Ultimately contributing to improved market efficiency and investor decision-making.

## 4 Research methodology

The panel data used in this study from 2011 to 2020, including daily returns of companies listed on the PSX (KSE All Share). The data used in the paper comprise 482 listed companies. Data is obtained from different databases Karachi Stock (https://www.khistocks.com/), yahoo finance (https://finance.yahoo.com/), and the PSX (https://www.psx.com.pk/). We study herding in the overall market and in five Quintiles arranged in descending order of firm size.

We have examined whether herding behaviour changes across large and small firms. Based on firm size, portfolios are created, by rating all companies at the beginning of each year, the companies were divided into five equal quintile groups based on their market capitalisation in December of the preceding year (Arjoon et al., 2020). Quintile 1 is the smallest quintile whereas quintile 5 is the largest. Once portfolios are constructed in this way, they retain their composition for the rest of the year.

### 4.1 Methodical review

The recent literature on herding behaviour employs two methodological approaches which are used for herding analysis CSAD and CCSD. The goal is to discern whether the observed buying or selling activity arises from herding behaviour or simply a collective response to the information available. Understanding these distinctions is crucial in

gaining insights into the motivations and dynamics behind market participants' actions and their impact on financial markets.

Christie and Huang (1995) established the CH model, which is the most often used model to study herding behaviour. It uses CSSD to identify market-wide herd behaviour. It looks at the cross-sectional association of all stocks traded. This measure compares stock returns to the market return. While the CSAD approach is developed on the CSSDs' assumptions, it has notable deviations. The CSAD approach is more sophisticated since it is capable of capturing herd behaviour during times of abnormal market returns. This approach is built on the concept of absolute return deviation. Herd behaviour results in the aggregation of individual security returns, particularly during times of market return.

The method used in this study for detecting herding behaviour is this study CSAD measure because it has been argued that the CCSD is not the most powerful test to detect herding. So Chang et al. (2000) suggested the CSAD regression. The CSSD model was unable to capture the nonlinear connection between cross-section market dispersion and market return, the CSAD method was developed to capture the nonlinear link between cross-sectional market dispersion and stock returns.

## 4.2   Cross-sectional absolute deviation

As follows is a representation of the model:

$$CSAD = \frac{1}{N}\sum_{i=1}^{N}|R_{it} - R_{mt}| \tag{1}$$

If $R_{it}$ denotes the stock return of companies, $I$ at time $t$ and $R_{mt}$ denotes the market return on investment at time $t$. Chang et al. (2000) utilised CSAD and the following equation to represent the nonlinear relationship:

$$CSAD_t = \alpha + \gamma_1|R_{mt}| + \gamma_2 R_{mt}^2 + \varepsilon \tag{2}$$

A nonlinear relationship between the returns on individual stocks and market returns is asserted by this measure. In a herd-free marketplace, market returns and the returns on individual securities move in the reverse direction, resulting in a more linear connection. Stock return and market return dispersion are linearly connected when $\gamma_1$ is positive, demonstrating the absence of herding. In contrast, since stock returns are not linearly related to market returns, a negative value of $\gamma_2$ indicates herding behaviour during periods of severe market volatility. The link between CSAD and $R_m$ is likely to be asymmetrical, and herd behaviour may be seen both during up and down markets. This specific test may be used for the whole market, however, it is divided into two parts based on the direction of the substantial market return.

$$CSAD_t^{Up} = \alpha + \gamma_1^{Up}\left|R_{mt}^{Up}\right| + \gamma_2^{Up}\left(R_{mt}^{Up}\right)^2 + \varepsilon_t \text{ if } R_{mt}^{Up} > 0.3 \tag{3}$$

$$CSAD_t^{Down} = \alpha + \gamma_1^{Down}\left|R_{mt}^{Down}\right| + \gamma_2^{Down}\left(R_{mt}^{Down}\right)^2 + \varepsilon_t \text{ if } R_{mt}^{Down} < 0 \tag{4}$$

$\gamma_2$ = if significant show herding behaviour.

Here $R_{mt}^{Up}$ refers to the positive market returns while $R_{mt}^{Down}$ refers to the negative market returns on day $t$. $CSAD_t^{Up}$ refers to the CSAD when market returns are positive

while $CSAD_t^{Down}$ refers to the CSAD when market returns are negative at day $t$. Herding exists during a bull market if $\gamma_2^{Up}$ is negative. And herding exists during a bear market if $\gamma_2^{Down}$ is negative.

This model can be advantageous when conducting empirical research or when the focus is on a straightforward analysis. CSAD treats positive and negative deviations equally, while CSSD considers both the magnitude and direction of deviations by squaring them. Herding behaviour can involve collective buying or selling actions, and CSAD captures both types of deviations symmetrically. This symmetry can be beneficial when examining the overall level of dispersion or deviation in the data without emphasising the direction of the deviations. CSAD has a more intuitive interpretation. CSAD represents the average absolute difference from the mean return, which directly reflects the dispersion of individual stock returns from the benchmark. This intuitive interpretation can make it easier for researchers and practitioners to understand and communicate the findings related to herding behaviour.

## 5    Analysis and results

### 5.1   Descriptive analysis

Descriptive statistics provide a record of the activities of the parameters and explain other possible distribution features of the data collection. To demonstrate the gathering of data, we utilised the central trend (mean) and measures of variance (Standard deviation, maximum, and minimum).

**Table 1**     Descriptive statistics of the independent and dependent variables

| Variables | Obs. | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| $R_{it}$ | 1,194,861 | 0.00113 | 0.04620 | −1 | 20.0741 |
| $R_{mt}$ | 1,194,877 | 0.00058 | 0.01036 | −0.068560 | 0.047953 |
| R_mt2 | 1,194,877 | 0.00012 | 0.00026 | 0.000001 | 0.004700 |
| CSAD | 1,194,861 | 0.00011 | 0.00009 | −0.002099 | 0.041644 |
| $|R_{mt}|$ | 1,194,877 | 0.00739 | 0.00728 | 0.000061 | 0.068560 |
| Upper return | 644,434 | 0.00738 | 0.00675 | 0.000061 | 0.047953 |
| Upper return$^2$ | 644,434 | 0.00010 | 0.00019 | −0.000001 | 0.002229 |
| Lower return$^2$ | 550,443 | 0.00012 | 0.00032 | 0.000001 | 0.00470 |
| \|Lower return\| | 550,443 | 0.00739 | 0.00786 | 0.000139 | 0.068560 |
| Upper CSAD | 644,428 | 0.00043 | 0.00095 | 0.000009 | 0.041644 |
| Lower CSAD | 550,433 | 0.00004 | 0.00007 | 0.000003 | 0.013700 |
| Capitalisation lag | 1,068,933 | 12,930.65 | 52,054.52 | 0 | 1,192,183 |

Notes: The abbreviation of variables that have been used in this table are market return square $(R_{mt}^2)$, CSAD, and absolute market return ($|R_{mt}|$).

## 5.2   Regression analysis

If the data has no unit root, then we run regression analysis. To check the influence of Stock return on herding behaviour, CSAD model is used.

### 5.2.1   Regression results using CSAD

In Table 2 herding is taken as a dependent variable which is measured through the CSAD approach. The significance and positive value of the $\gamma_1$ coefficient is shown in this table. A statistically insignificant but positive outcome indicates there was no indication of herding for the nonlinear factor $\gamma_2$ $(R^2_{mt})$.

**Table 2**     Regression result by using the CSAD model

| |CSAD| | Coefficient | Std. err. | P > t | Sig. |
|---------|-------------|-----------|-------|------|
| $|R_{mt}|$ | 0.0010575 | 0.0000221 | 0.000 | *** |
| $R^2_{mt}$ | 0.0007145 | 0.0006121 | 0.243 | |
| _cons | 0.0000340 | 1.35e-07 | 0.000 | *** |

In Table 3 herding is taken as a dependent variable which is measured through the CSAD approach. The significance and positive value of the $\gamma_1$ coefficient is shown in this table. A statistically significant and positive outcome indicates there was no indication of herding for the nonlinear factor $\gamma_2$ (upper $R^2_{mt}$). If $\gamma_2$ is negative, then herding is present during a bullish phase.

**Table 3**     Regression result by using the CSAD model during up market return

| |Upper CSAD| | Coefficient | Std. err. | P > t | Sig. |
|---------------|-------------|-----------|-------|------|
| $|Upper\ R_{mt}|$ | 0.0009974 | 0.0000416 | 0.000 | *** |
| Upper $R^2_{mt}$ | 0.0042583 | 0.0014315 | 0.003 | *** |
| _cons | 0.0000353 | 2.21e-07 | 0.000 | *** |

In Table 4 herding is taken as a dependent variable which is measured through the CSAD approach. The significance and positive value of the $\gamma_1$ coefficient is shown in this table. A statistically significant and positive outcome indicates there was no indication of herding for the nonlinear factor $\gamma_2$ (down $R^2_{mt}$). If $\gamma_2$ is negative, then herding is present during a bearish phase.

**Table 4**     Regression result by using the CSAD model during down market return

| |Down CSAD| | Coefficient | Std. err. | P > t | Sig. |
|--------------|-------------|-----------|-------|------|
| $|Down\ R_{mt}|$ | 0.0010121 | 0.0000256 | 0.000 | *** |
| Down $R^2_{mt}$ | 0.0011772 | 0.0006235 | 0.059 | * |
| _cons | 0.0000329 | 1.63e-07 | 0.000 | *** |

### 5.2.2 Regression results using CSAD in quintiles

This study also found herding behaviour by dividing the data into five equal quintiles. In this also the CSAD is used because it is a more powerful and more accurate measure to detect herding these quintiles are made based on firm size. Quintile 5 is the largest, while quintile 1 is the lowest in terms of size (Arjoon et al., 2020). Once portfolios are constructed in this way, they retain their composition for the rest of the year.

In Table 5 herding is taken as a dependent variable which is measured through the CSAD approach. The results of OLS regression indicate that the significance and positive value of the $\gamma_1$ coefficient of quintile 1, quintile 2, quintile 3, quintile 4, and quintile 5 are shown in this table. A statistically significant and positive outcome of quintile 1, quintile 2, and quintile 3 indicates there was no indication of herding for the nonlinear factor $\gamma_2$ ($R^2_{mt}$). Whereas in quintile 4 and quintile 5 significant and negative outcome of nonlinear factor $\gamma_2$ ($R^2_{mt}$) indicates there is an indication of herding. This shows that larger companies attract more investors' attention than small ones. These findings suggest that herding is much more prevalent in large firms.

**Table 5** Regression result by using the CSAD model in quintiles

|  | $|R_{mt}|$ | $R^2_{mt}$ |
| --- | --- | --- |
| Quintile 5 (largest) | 0.0007456*** (0.000) | −0.004405*** (0.000) |
| Quintile 4 | 0.0008908*** (0.000) | −0.0019995*** (0.002) |
| Quintile 3 | 0.0008379*** (0.000) | 0.0061048*** (0.000) |
| Quintile 2 | 0.0012951*** (0.000) | 0.0023686* (0.074) |
| Quintile 1 (smallest) | 0.001455*** (0.000) | 0.0055842*** (0.001) |

In Table 6 herding is taken as a dependent variable which is measured through the CSAD approach. The results of OLS regression indicate that the significance and positive value of the $\gamma_1$ coefficient of 1, quintile 2, quintile 3, quintile 4, and quintile 5 are shown in this table. A statistically significant and positive outcome of quintile 1, quintile 2, and quintile 3, indicates there was no indication of herding for the nonlinear factor $\gamma_2$ ($R^2_{mt}$). Whereas in quintile 4 insignificant and positive values of nonlinear factor $\gamma_2$ ($R^2_{mt}$) also show no indication of herding. Whereas in quintile 5 significant and negative outcome of nonlinear factor $\gamma_2$ ($R^2_{mt}$) indicates there is an indication of herding. This shows that larger companies attract more investors' attention than small ones. These findings suggest that herding is much more prevalent in large firms when the market return is up.

**Table 6** Regression result by using the CSAD model in quintiles during up market return

|  | $|Upper\ R_{mt}|$ | $Upper\ R^2_{mt}$ |
| --- | --- | --- |
| Quintile 5 (largest) | 0.0007272*** (0.000) | −0.0025468*** (0.015) |
| Quintile 4 | 0.0008034*** (0.000) | 0.019572 (0.157) |
| Quintile 3 | 0.000783*** (0.000) | 0.0093713*** (0.000) |
| Quintile 2 | 0.0011191*** (0.000) | 0.0094282*** (0.001) |
| Quintile 1 (smallest) | 0.0014746*** (0.000) | 0.0071194* (0.064) |

In Table 7 herding is taken as a dependent variable which is measured through the CSAD approach. The results of OLS regression indicate that the significance and positive value of the $\gamma_1$ coefficient of quintile 1, quintile 2, quintile 3, quintile 4, and quintile 5 are shown in this table. A statistically significant and positive outcome of quintile 1 and quintile 3, indicates there was no indication of herding for the nonlinear factor $\gamma_2$ ($R_{mt}^2$). Whereas insignificant and positive outcome of quintile 2 indicates there was no indication of herding for the nonlinear factor $\gamma_2$ ($R_{mt}^2$). Whereas in quintile 4 and quintile 5 significant and negative outcome of nonlinear factor $\gamma_2$ ($R_{mt}^2$) indicates there is an indication of herding. This shows that larger companies attract more investors' attention than small ones. These findings suggest that herding is much more prevalent in large firms when the market return is down.

**Table 7**    Regression result by using the CSAD model in quintiles during down market return

|  | $\lvert Down\ R_{mt} \rvert$ | $Down\ R_{mt}^2$ |
|---|---|---|
| Quintile 5 (largest) | 0.0006941*** (0.000) | –0.0037369*** (0.000) |
| Quintile 4 | 0.0008895*** (0.000) | –0.0024148*** (0.002) |
| Quintile 3 | 0.0007961*** (0.000) | 0.0064561*** (0.000) |
| Quintile 2 | 0.0013032*** (0.000) | 0.0017522 (0.256) |
| Quintile 1 (smallest) | 0.0013092***(0.000) | 0.0079068* (0.000) |

Regression assumes that the explanatory variables are not significantly correlated. Multi-collinearity is tested using the VIF test. Table 8 shows VIF values of less than 5 or less than 10 in every case.

**Table 8**    VIF test for checking multi-collinearity

| Variable | VIF | 1/VIF |
|---|---|---|
| $R_{mt}^2$ | 4.253 | 0.235 |
| $\lvert R_{mt} \rvert$ | 4.253 | 0.235 |
| *Upper return* | 5.651 | 0.177 |
| *Upper return*$^2$ | 5.651 | 0.177 |
| $\lvert Down\ return \rvert$ | 4.28 | 0.234 |
| *Down returns*$^2$ | 4.28 | 0.234 |

The second post-diagnostic regression test we have used is to examine heteroscedasticity. White's test was run to check the problem of heteroscedasticity. The result shows that the prob. > chi value = 0.0496 so this study rejects Ho which confirms that there is heteroscedasticity in this data.

## 5.3   Discussion

The purpose of the present research is to analyse herd behaviour in PSX using the CSAD model. Furthermore, five quintiles are developed to observe the herd behaviour according to the firm size. Firstly, in this study, the descriptive statistics of the entire variable is checked.

The CCSD is not the most powerful test to detect herding. So Chang et al. (2000) suggested the CSAD regression. As previously stated in the literature since the CSSD model was unable to capture the nonlinear connection between cross-section market dispersion and market return, the CSAD method was developed to capture the nonlinear link between cross-sectional market dispersion and stock returns. Two key differences between CSAD from CSSD's first indicator of the cross-sectional differences in returns is the absolute deviation and standard deviation and the other is model specification is nonlinear. This indicates either there is herding in the market or it is the synchronisation of trading signals and disregard for individual stocks fundamentals, or everything is behaving in the way that is expected by the rational investor hypothesis.

We are looking for $R^2_{mt}$ that relates to the CSAD. Nonlinear dynamics of herding behaviour are checked and if herding exists this coefficient is negative and significant, the CSAD would be negative when the market goes significantly up or down, and if the market is rational this would be significantly positive. In Tables 2, 3, and 4 for daily returns, the regression findings show that the nonlinear factor $\gamma_2$ ($R^2_{mt}$) all coefficients are substantially positive. These all regression models show the absence of herding behaviour. There is no indication of considerable herding throughout the entire, up and down periods in Pakistan's stock market returns. Javaira and Hassan (2015), as well as Khan and Abbas (2013), study herding in the Pakistani Stock Exchange using CSSD and CSAD measures and find that there is no evidence of herd in the KSE. This result is congruent with the findings of Khan and Rizwan (2018) used daily stock prices, CSSD, and CSAD measurements to analyse herd behaviour in 18 PSX sectors. CSSD showed no symptoms of herding. Furthermore, Yousaf et al. (2018) and Javed et al. (2013) examined herding tendency in the PSX in different market circumstances. They also applied CSSD and CSAD measurements and found no evidence of herding effects in the overall timeframe but did find it during the 2005–2007 crisis periods. It has been suggested that assets in the Pakistani stock market are mispriced since the market is influenced by speculator impulses. Because of information asymmetry for traders, unpredictability in market patterns, and a poorly regulated market structure, speculative and insider trading attitudes have dominated the market. Price volatility and price manipulation were frequently the outcome of inefficient market behaviour. The existence of short-term speculation also has an impact on the pricing mechanism.

To create the quintiles, all companies are ranked according to their market capitalisation in December of the preceding year and then divided into five equal quintile groupings at the beginning of each year. Once portfolios are constructed in this way, they retain their composition for the rest of the year. Quintile 5 is the largest, while quintile 1 is the lowest in terms of size (Arjoon et al., 2020). We perform a thorough investigation to investigate whether the herding patterns of small and large firms are different. This research is critical since institutional shareholders and analysts often pay less attention to small firms.

In Table 5 herding is shown in the larger firm. Larger companies attract more investors' attention than small ones because small firms are often facing the problem of liquidity. This increases essential information and minimises information asymmetry for larger firms. Some individual investors who traded this portfolio may be to blame for the herding in the higher quintiles. Institutional and overseas investors, in particular, have access to a wealth of information that retail investors lack. By participating in positive feedback trading, some institutional investors may herd as well (Nofsinger and Sias,

1999). Prices may become less informationally efficient if herd behaviour causes them to destabilise and shift away from their underlying values. Some of the information relative to such companies may be identical, investors are likely to herd within their size class. In addition, smaller companies are more likely to create less data than larger ones. When companies are classified according to their size, large companies exhibit herding behaviour. These findings imply that herding behaviour is more common in large companies (Shah et al., 2017). This study found that investors in large companies tend to keep a closer eye on the market than investors in smaller companies. This study implies that separating small or large firms when examining herding behaviour would give better results. Shah et al. (2017) discovered that although individual companies do not exhibit herding behaviour using the CSSD model. But when companies are classified according to their size, large companies do exhibit herding behaviour. In this study, the CSAD model is used and by separating small and large firms according to their size large firms show herding behaviour.

In Table 6 during rising market circumstances, large firms exhibit herding behaviour. According to Tan et al. (2008) and Chiang and Zheng (2010), herding is higher during rising market circumstances, which may be attributable to investors responding to the recommendations of analysts who suggested orders more frequently than sale orders. Herding arises in the largest firms due to more liquidity and volatility during a rising market situation as contrasted to a falling market condition.

In Table 7 during a down market, large firms exhibit herding behaviour. According to Demirer and Kutan (2006), Zheng et al. (2017) and Yao et al. (2014) studies, investors herd in collapsing markets as a 'flight to safety strategy'. According to Yao et al. (2004), herding is often more prevalent during market downturns. A probable explanation is that experts advised more sell orders, which resulted in increased herding in down-market situations.

Our findings show that herding is more prevalent in large companies and attracts more investors' attention than in small ones. This increases essential information and minimises information asymmetry for larger firms. Some individual investors who traded this portfolio may be to blame for the herding in the higher quintiles. Understanding herding behaviour is also a big issue for policymakers since it has the potential to increase volatility, destabilise financial markets, and even trigger a financial catastrophe in certain cases. Herding in emerging markets like Pakistan is caused by huge speculators investing for a short period, constant government participation generating market inefficiencies, and poorly formed microstructures. Investors' herding is the main cause of speculations since it implies that investors make similar trading decisions, resulting in stock prices diverging from their intrinsic worth.

Herding conduct has been an attractive issue in the literature because it magnifies volatility, destabilises financial markets, and enhances the financial system's fragility because the appearance of subjective expectations about the future development of risk and profitability may impact investment choices. Individual investors, policymakers, and forecasters all care about how closely stock price indices in developed and emerging countries move together. It is important to remember that market volatility is unavoidable. The fluctuations of the stock indexes are closely followed by the general public. Price and market return volatility inform investors about the 'risk' connected with their investments. This study's conclusions may have far-reaching implications for the financial industry. This research will help economists, policymakers, and investors to understand how anticipation affects future possible risks, yields, and volatility. While the

outcomes of this research help portfolio managers to understand how to adapt risk-return in stock markets, they also shed light on how regulators make decisions when formulating financial market laws that are appropriate for market participants.

# 6 Conclusions

Growth in the stock market is often seen as a key financial goal. A stock market is a crossroads of the financial market where buyers and sellers of shares meet to satisfy their wants at a pre-negotiated price. However, the financial market has a critical role to play in the long-term viability in financial markets, leading to the creation of a wide range of economic transaction histories. This study provides significant insight into market behaviour by using CSAD techniques to assess herd behaviour in the PSX. There is no indication of herding found during both up and down market conditions. When the entire market returns data is included, the research does not reveal herding behaviour.

Additionally, this study investigates herding in the PSX by developing five quintile portfolios depending on size. We can account for the fact that information outflows and investor knowledge vary with business size by controlling for it. At the same time, we can also get a better look at the dynamics of herding inside a market. These findings imply that herding behaviour is more common in large companies. This study found that investors in large companies tend to keep a closer eye on the market than investors in smaller companies. This study implies that separating small or large firms when examining herding behaviour would give better results. When companies are classified according to their size, large companies exhibit herding behaviour.

It helps in identifying possible hazards and developing an effective investing plan for the PSX. Due to mispriced assets, unpredictable investor behaviour, and inefficient markets, foreign investors should be careful while investing, since a large number of securities is necessary to obtain the same degree of diversification as in a normal market. Similarly, to value assets accurately, investors need to evaluate the importance of the herding factor at a given moment in time. This research aims to assist decision-makers in thoroughly investigating these market anomalies to facilitate processes.

# 7 Practical implication

This study offers significant guidance to individual investors, business owners, and regulators. Herding is an important component that is hard to eliminate. It assists in identifying possible hazards and assists in developing an effective investing plan for the PSX. Due to mispriced assets, unpredictable investor behaviour, and inefficient markets, foreign investors should exercise care while investing, since a large number of securities is necessary to obtain the same degree of diversification as in a normal market. Similarly, to accurately value assets, investors need to evaluate the importance of the herding factor at a given moment in time.

The study's objective is to provide assistance to the policymakers, and practitioners. For practitioners, herding generates valuable trading opportunities by deviating asset prices from their basic values. Contrarily, economists may evaluate the stock market's herding behaviour impact to forecast future risk and profitability. This research aims to

assist decision-makers in thoroughly investigating these market anomalies to facilitate processes.

## 8  Limitations and future directions

This research only covers ten years of data because of financial constraints and the unavailability of data. Future studies in Pakistan will be able to quantify herd behaviour via the use of primary data. Primary data may give further insight into the herding phenomena since it is based on investors' real-world experience and can be used to create a herding scale. Additionally, future scholars might investigate herd behaviour in Central and Eastern Europe stock. The researcher will also examine the relationship and impact of herding, volatility, and liquidity.

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## Abbreviations

| | |
|---|---|
| PSX | Pakistan Stock Exchange |
| CSAD | Cross-sectional absolute deviation |
| CSSD | Cross-sectional standard deviation |