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Triggering of Herding Instincts due to COVID-19 Pandemic in Pakistan Stock Exchange

Shaista JABEEN¹, Sayyid Salman RIZAVI², Adeel NASIR³

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Abstract

The present research intends to examine the herding aspect during the COVID-19 outbreak. The study is conducted to achieve specific objectives, so the underlying sampling technique is purposive sampling. The considered data source is the Pakistan Stock Exchange (PSX). Daily stock prices of 528 listed companies in PSX have been taken from the official website of PSX from 1998 to 2021. The current study envisions investigating the herding aspects for pre-pandemic and the time covering the pandemic period. The study has also targeted ten sectors of PSX. The present study's motive is to investigate investors' herding prospects before and during the pandemic in the Pakistan Stock Exchange (PSX) and its selected sectors. Daily closing stock prices of listed companies have been collected from the official website of PSX to calculate the stock returns. The Cross-Sectional Absolute Deviation (CSAD) has been used as a herding measure. Findings revealed that herding has not been observed in PSX during both time spans and even not during the bullish and bearish trends. However, robust sectoral evidence has been observed during the pandemic. It implies that investors in PSX tend to follow the crowd irrespective of making their own decisions to avoid further losses.

Keywords: Pandemic, Herd Behavior, Cross-Sectional Absolute Deviation, COVID-19, Pakistan Stock Exchange, Financial Markets

JEL Classification Code: G11, C33, E44, G15

1. Introduction

Herding is an essential phenomenon in financial markets. The herding behavior in financial markets indicates the process whereby the different participants of the market trade in a similar direction simultaneously (Mandal, 2011). Herding deals with the imitating behavior of investors in which they follow other knowledgeable investors, despite knowing their information is better than others. Investors seem to be engaged in herding, specifically during panic market conditions, where they follow the crowd to avoid uncertain conditions or protect them from further losses (Waheed et al., 2020). The COVID-19 pandemic is an uncertain hazard that has significantly influenced economies, financial markets, stock markets, and investors' financial decisions.

The turning of 2019 and rising of 2020 has faced the effects of a novel virus, COVID-19 (Boot et al., 2020). The coronavirus disease was detected in the Wuhan city of China in December 2019, and it was termed COVID-19. Globally, this virus is spreading at an escalating rate. From January to date, the number of victims of this virus has increased worldwide, particularly in China, Iran, Italy, France, Germany, USA, UK, and many other countries. To date of this writing, the total confirmed cases of COVID-19 are 208,263,868, out of which 4.379,612 deaths and 186,733,402 recovered cases have been observed around the globe. Moreover, taking into consideration the ranking of countries infected from this pandemic, the USA is at the top having 37,469,989 cases, India is at 2nd number with 32,249,573 cases, Brazil has 20,364,099 reported cases, Russia and France are at

¹First Author. Lecturer, Department of Management Sciences, Lahore College for Women University, Lahore, Pakistan [Postal Address: Lahore College for Women University, Jail Road, Lahore, 54000, Pakistan] Email: Shaista.jabeen@lcwu.edu.pk

²Professor, Hailey College of Commerce, University of the Punjab, Director General Gujranwala Campus, Pakistan.

Email: dg.grw@pu.edu.pk

³Corresponding Author. Assistant Professor, Department of Management Sciences, Lahore College for Women University, Lahore, Pakistan [Postal Address: Lahore College for Women University, Jail Road, Lahore, 54000, Pakistan] Email: adeelnasir486@yahoo.com

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4th and 5th number with confirmed cases of 6.621,601 and 6,471,035. The origin point of COVID-19, i.e., China, has controlled the effects of this outbreak and now has reported 94,430 cases (Worldometer, 2020).

This pandemic has pushed the world's economy towards the depression and raises a question for economists on how to manage financial stability? (Boot et al., 2020) as it can lead to an economic recession (Adrian & Natalucci, 2020). The IMF predicted a 3% decline in 2020 by keeping the fastest shrinking global economies and considered this downfall the worst one following the great depression (Chan, 2020). The IMF has labeled this crisis as "The Great Lockdown." The IMF forecasted a 1.4% Gross Domestic Product growth of the United Kingdom; however, now the same institution predicted a 6.5% contraction of the economy in 2020. The US economy has also expected to shrink by 5.9% in 2020, the biggest fall since 1946 (Chan, 2020).

The economy of Pakistan is fragile indeed, and it was in the recovery phase since the happening of this incident. Experts are anxious concerning the slow recovery process of the economy. Pakistan's economy is shrinking, unemployment is rising, and various sectors are in crisis,' warned Zafar Moti, the former director of the Karachi Stock Exchange (KSE). Moreover, Mr. Khurram Shehzad, the investment banker, has predicted the shrink of Pakistan's economy by \$ 15 billion and the respective 10% decline in GDP in 2020. As per the finance minister's pre-budget report, a reduction of 71% has been noticed in the current account deficit. Exports have been reduced by 2.4% and imports by 16.9%. Resultantly the trade deficit has been observed to be reduced by 29.5%. The international investors have withdrawn around \$83 billion. The worst situation has compelled the nation's citizens to limit their savings to cope with the unexpected time to come. The outbreak is troubling the economy in several ways (Phase-1), i.e., disturbed supply lines, shut-down of significant industries, restaurants, marriage halls, schools, travel and tourism industry, the airlines' industry, and many more. World tourism and travel council has announced a 5.9% rise in the tourism industry of Pakistan, contributing a significant part in the economic development and GDP; however, the imposed lockdown due to pandemic has resulted in a dreadful situation. Government has to show its concern for saving lives and livelihood. However, the relaxation in lockdown and reopening of markets has resulted in the escalated cases of COVID-19 (Phase-II, Phase III, and even Phase-IV), so the officials are in a ping pong game of running the economy (The Express Tribune, 2020). IMF has made projections about the Pakistan economy, i.e., the contraction in the economy by 1.5% with 2% growth in 2021; increase in CPI by 11.1%; deficit in the current account to touch 1.7% of GDP; and rise of the unemployment rate to 5.1%.

Taking the prospects of the financial markets into the loop, the performance of global financial markets has fallen following the ripple effects of the pandemic (Erdem, 2020). The global stock market crash of 2020 was instigated on February 20, 2020 (Jolly, 2020). Moving towards Pakistan, speckled effects have been noticed from January 2020 to date. PSX demonstrated a bullish trend at the start of the year, and KSE-100 Index reached the recorded index point; however, the month of February exhibited the depression phase as per the massive selling of stocks and unstable political conditions (Figure 1). Somehow bullish drift was observed in March 2020 following the decline in petroleum rates and inflation rate. Authorities took some measures to regulate the stock market performance, of which Market Halt was the significant one. The Market Halt is activated when the KSE-100 Index moved 4% or 5% either way and continued for five consecutive minutes. During such a halt, every kind of market activity is deferred, known as the "cooling off" period. Various market halts were observed under such a strategy. The month of April 2020 paved the way to the so-called green zone due to the approval of \$ 1.4 billion loans from the IMF and the issuance of some Exchange Traded Funds (ETF). From April to date, ping pong effects have been experienced. The Index moved upward but gradually revealed both the bullish and bearish trends as per the Outbreak situation. Despite all, efforts have been made to maintain or improve the performance of PSX even when the global economies are struggling to keep themselves protected from the devastating effects of the pandemic.

The present study intends to examine the herding phenomenon concerning the COVID-19 pandemic. Existing studies have thoroughly explored the COVID-19 and its impact on stock market performance in local (Shehar Yar, 2020; Waheed et al., 2020) and international (He et al., 2020; Topcu & Gulal, 2020) contexts. In addition, some researchers have explored the phenomenon of COVID-19 and herding internationally (Allam et al., 2020; Arias, 2020; Asia, 2020; Chang et al., 2020; Kizys et al., 2020). However, in the context of Pakistan, authors could not find the studies concerning the herding aspect and COVID-19-19 pandemic. Hence, the current research will move one step ahead to have an in-depth idea of these variables of interest to contribute to the literature. To achieve this objective, the daily stock price data of all the companies listed in the Pakistan Stock Exchange (PSX) from 1998-2021 has been the point of focus. Moreover, ten sectors have also been targeted for thoroughly exploring herding aptitude. The novel aspect of existing research emphasizes the herding exploration before and during the COVID-19 period, i.e., examining cumulative herd behavior before 2021 and then the presence/absence of herding during the COVID-19 period.



Pre-COVID COVID Period

2. Literature Review

Theoretically, the phenomenon of herd behavior has been categorized into intentional and spurious herding; however, these theoretical aspects are quite challenging to differentiate (Bikhchandani & Sharma, 2000). Therefore, the primary emphasis of researchers has remained on exploring herding in different financial markets during various periods and through novel herding measures.

Christie and Huang (1995) conducted the pioneering work of herding, and the presented model is known as Cross-Sectional Standard Deviation (CSSD). The study was carried out in USA, South Korea, and Taiwan; however, herd behavior was not observed in USA, demonstrating that investors in these markets believe in their information. Chang et al. (2000) carried out the second known study, and they have presented a measure known as Cross-Sectional Absolute Deviation (CSAD). The authors found partial herding in Japan, strong herding in Taiwan & South Korea, and non-existence in the USA. Finally, Hwang and Salmon (2004) observed the herding aspect in South Korea, deducing that herd behavior is a relative concept.

Chiang and Zheng (2010) could not detect herding in Asian markets and developed stock markets. On the other hand, Demirer et al. (2010) noticed its evidence in the Taiwan stock market during bullish trends. Similarly, Blasco et al. (2011) observed the intentional aspect of herding in Spanish bullish and bearish markets. Likewise, Mandal (2011) presented its evidence in the Indian National stock market on S & P Nifty 50 index. The existence of herding was also reported in Istanbul markets (Kapusuzoglu, 2011).

Moreover, Lao and Singh (2011) researched Indian and Chinese markets and found its presence in Chinese markets during bearish trends and in the Indian market during the bullish trend. Mwimali (2012) used the CSAD model and presented the absence of herd behavior in the Jordanian Stock Exchange before and after the global financial crisis of 2008; however, the CSSD measure demonstrated its existence during the crisis period. Seetharam (2013) found evidence of herding in South Africa but could not observe its evidence in the bearish market. Holmes et al. (2013) noticed intentional herding in the Portugal stock market. Conversely, Ahsan and Sarkar (2013) did not find it in the Dhaka stock market. However, Cakan and Balagyozyan (2014) demonstrated the herding phenomenon in the Turkish banking sector. Similarly, Teng and Liu (2014) exhibited herd behavior in Greater Chinese stock markets. El-Shiaty and Badawi (2014) found it in the Egyptian stock market. During the subprime mortgage crisis, Garg and Jindal (2014) noticed herd behavior in six Asia Pacific markets.

Herding effects were observed in the Amman stock market (Ramadan, 2015). Mahmud and Tinic (2015) showed herding in Chinese A-shares markets during bearish and B share markets during bullish trends. A similar result was reported by Chong et al. (2016). Herding was detected in the Korean stock market during panic market conditions, and bullish markets were found more potent. Vietnam stock market also reported its evidence during the bullish and bearish market trends (Vinh & Anh, 2016). Zheng et al. (2017) established the robust existence of herd behavior in the technology and financial sectors and partial evidence in the utility sector. Chen et al. (2017) revealed the presence of

Figure 1: PSX vs Global Markets

herding in bullish Chinese markets. However, Mertzanis and Allam (2018) did not find herd behavior in the bullish and bearish Egyptian stock markets. Sharma (2018) also could not see herding signs during bullish, bearish, and extreme price movements, and he noticed limited effects during robust down markets. Brendea and Pop (2019) investigated herd behavior in the Romanian Stock Exchange. Shantha (2019) reported the herding signs in the Colombo Stock Exchange. Stavroviannis and Babalos (2019) explored negative herd behavior in Eurozone stock markets. Ju (2019) described the presence of herding in Chinese A and B share markets. Arjoon et al. (2019) discovered herd behavior in the Singapore exchange and its sectors. Bharti and Kumar (2020) investigated herd behavior in fast-moving consumer goods of the Indian Nifty 50 market during the global financial crisis and could not find evidence of herd behavior. Lu and Luong (2020) examined herding behavior in frontier and emerging Vietnam and Taiwan stock markets during the influenza pandemic. Herding was primarily observed in Vietnam markets as compared to Taiwan markets. Jalal et al. (2020) studied herd behavior in cryptocurrencies of CC130 and sub-major cryptocurrencies of DJIA and found herding in cryptocurrencies during bullish market trends.

As far as Pakistan is concerned, researchers have used different measures to explore the herding phenomenon. The studies have been conducted in different time spans by employing various herding measures. The findings of these researches represented mixed evidence, i.e., presence and the absence of herding. Javaira and Hassan (2015) and Javed et al. (2013) used daily and monthly data and CSSD and CSAD measures; however, they did not reveal their existence in Karachi Stock Exchange. On the other hand, Malik and Elahi (2014) used least-square and quantile regression analysis and demonstrated herd behavior during bullish and bearish trends. Likewise, Zafar and Hassan (2016) also presented its evidence. Shah et al. (2017) observed the signs of herd behavior in specific sectors of PSX. The sectoral evidence of herding was also observed by Khan and Rizwan (2018).

Moreover, Yousaf et al. (2018) detected herding in KSE-100 Index concerning Ramadan effects. Conversely, Jabeen and Rizavi (2019, 2021) employed the measure used by Chiang and Zheng (2010) and were unable to find its existence in PSX; however, they detected its presence in some sectors of PSX. Similarly, Kiran et al. (2020) did not find herding signs in PSX.

Researchers have made significant contributions to the literature by focusing on the literature of the COVID-19 pandemic and stock market performance. Topcu and Gulal (2020) explained that the adverse effects of COVID-19 on the emerging stock markets have decreased over time. The results have been observed mainly in Asian emerging markets as compared to European markets. Moreover,

government facilitation can provide support to mitigate the effects of the virus. Chang et al. (2020) reported herd behavior due to the COVID-19 pandemic in the USA, Europe, and Asia during high and low oil returns. He et al. (2020) highlighted the significant negative impact of COVID-19 on China, France, Germany, Spain, Japan, South Korea, and the UK. Waheed et al. (2020) reported the positive increments in stock returns due to the pandemic in the Pakistan stock market. The government interventions have protected investors under such disasters. Shehar Yar (2020) conducted a study to explore the effect of COVID-19 on the performance of the Pakistan stock market. The findings suggested that COVID-19 recoveries influenced the performance of the Index and daily positive cases, whereas fatalities insignificantly related to the performance.

Internationally, limited studies are available investigating the impact of the pandemic on herd behavior, but to date, researchers could not find any paper exploring such a relationship in Pakistan. Asia (2020) investigated the herd behavior during the pre and post-pandemic time in the Indian National Stock Exchange at the industry level. The findings revealed the absence of herding at sectoral levels; however, it was observed during the bullish and bearish trends. Kizys et al. (2020) described that the role of government could mitigate herding prospects in international markets during the COVID-19 period. Besides, Arias (2020) noticed the strong herding effects in France, Germany, Italy, UK, and Spain during the pandemic. Moreover, Allam et al. (2020) observed the impact of the virus on the herding attitude of investors in the Egyptian stock market.

3. Data and Methodology

The present research intends to examine the herding aspect concerning COVID-19 Outbreak. The study is conducted to achieve specific objectives, so the underlying sampling technique is purposive sampling. The considered data source is the Pakistan Stock Exchange. Daily stock prices of 528 listed companies in PSX have been taken from the official website of PSX from 1998 to 2021. The current study envisions investigating the herding aspects for pre-pandemic and the time covering the pandemic era. The study has also targeted ten sectors of PSX. The selection of these sectors is, first, based on the number of companies. In other words, sectors having a more significant number of companies are being targeted. Second, as per the research objectives, a single industry with more companies has been selected from industries with similar products/services. Stock returns have been calculated using the daily closing stock prices through the $LN(P/P_{t-1}) * 100$ formula. The research has been processed by employing the CSAD measured which is explained as under:

CSAD deals with the absolute deviation of returns. The measure focuses on the return dispersion of individual securities and the weighted average market returns. If herd behavior exists, then the returns of individual securities will be gathered around the market, inferring that investors set aside their information and follow the information generated by the market.

The model is:

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

Where: $R_{i,t}$ = Stock return of firm *i* at time *t*; $R_{m,t}$ = Crosssectional average return of *N* stocks in the portfolio at time *t*; N = number of stocks in the portfolio.

The CSAD model illustrates herd behavior's existence by considering two factors of market returns and emphasizes the non-linear linkage between the returns of individual stocks and market returns. The non-linear association between these two returns portrays that they move in the opposite direction, demonstrating the absence of the herding phenomenon. On the other hand, the presence of herding reveals that this association decreases or at least increases at a less than proportionate rate as the market return. It can be tested by using the following equation:

The following equation is used to perform the tests:

$$CSAD = \alpha + \gamma_1 | R_{m,t} | + \gamma_2 R_{m,t}^2 + \varepsilon$$
 (2)

 $R_{m,l}$ = market return; γ_2 = if, significant and negative, infers herd behavior.

CSAD and R_m may have an asymmetric relationship, and herding can be examined for bullish and bearish periods. The test can be done just like the overall market, though it is categorized into two parts as per the direction of the relevant market return:

$$CSAD_{t}^{UP} = \alpha + \gamma_{1}^{UP} \left| R_{m,t}^{UP} \right| + \gamma_{2}^{UP} \left(R_{m,t}^{UP} \right)^{2} + \varepsilon_{t}$$
if $R_{m,t}^{UP} > 0$
(3)

$$CSAD_{t}^{DOWN} = \alpha + \gamma_{1}^{DOWN} \left| R_{m,t}^{DOWN} \right| + \gamma_{2}^{DOWN} (R_{m,t}^{DOWN})^{2} + \varepsilon_{t} \qquad \text{if } R_{m,t}^{DOWN} < 0$$

$$(4)$$

4. Results

Panel A and Panel B of Table 1 illustrate the daily descriptive statistics of CSAD and R_m for PSX and its sectors during pre-COVID and COVID time. Mean, standard deviation, maximum and minimum values have been reported. It seems that values of CSAD and R_m relating to PSX and its sectors are higher before COVID compared

to during the pandemic. High mean values assert increased market differences across sectoral returns. High standard deviation implies that surprising shocks or events cause unexpected cross-sectional discrepancies in the stock market and its sectors.

Panel C and D of Table 2 provide the stationarity results of CSAD, $|R_m|$ and $R_{m,t}^2$ for PSX and some of its sectors before and during COVID-19. The Augmented Dickey-Fuller test has been applied to check the stationarity of the variable. The null hypothesis is related to the presence of unit root, and it has been rejected in all the streams, implying that variables are stationary at their levels. It also means that data is constant over time.

Table 3 and Table 4 represent the regression results of PSX and its sectors before and during the pandemic. The robust values of *t*-statistics are considered to avoid any heteroscedasticity issue. The significant negative value of Y_2 relates to the existence of the herding phenomenon. As shown in the tables, the values of Y_2 are positive for PSX before and during the pandemic. Even the signs of herding are not observed during the up and down market conditions. However, the coefficient of determination is found to be at greater levels in both cases. The results follow the findings of Jabeen and Rizavi (2019) and Yousaf et al. (2018), who could not find herding in PSX.

In industry-related results, herding is observed in limited, targeted sectors of PSX before the pandemic. These sectors include automobile parts and accessories, food and personal care products, pharmaceuticals, synthetic and rayon, and textile spinning. In these industries, overall market conditions and bullish & bearish periods represent the presence of herding. The findings are supported by Jabeen and Rizavi (2019, 2021) and Yousaf et al. (2018). These authors also have observed herding in limited sectors of PSX during overall bullish and bearish market trends.

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The pandemic has led investors to engage in the herding vigorously; as we have found in Table 4, automobile parts and accessories, cement, and oil and gas distribution exhibit herding signs at all levels. However, as far as bearish market conditions are concerned, except insurance, food and personal care products, and synthetic & rayon, the remaining sectors have illustrated the presence of herding. Excluding insurance, the values of Y, are negative but statistically

			F	anel A (Pre	-COVID)				
		CSAD					R _m		
S. No.	Sector	Mean	Standard Deviation	Minimum	Maximum	Mean	Standard Deviation	Minimum	Maximum
	All Sectors (PSX)	2.342	1.578	0	57.346	0.026	0.867	-14.990	20.084
1	Automobile Parts & Accessories	2.353	3.755	0	122.552	0.0572	2.985	-121.603	86.914
2	Cement	2.088	1.356	0.001	25.720	0.037	1.658	-15.431	14.481
3	Chemicals	1.999	1.537	0	36.912	0.053	1.368	-21.147	18.945
4	Food & Personal Care Products	2.006	5.336	0	169.331	0.058	4.606	-151.415	202.595
5	Insurance	1.871	1.743	0	44.660	0.010	1.234	-26.623	21.229
6	Oil & Gas Distribution	1.440	2.544	0	97.297	0.034	2.164	-62.590	63.951
7	Pharmaceuticals	1.644	3.497	0	112.344	0.053	2.920	-112.344	88.775
8	Synthetic & Rayon	2.020	2.924	0	76.177	0.013	2.170	-60.147	64.412
9	Sugar & Allied Industries	2.572	2.651	0	57.154	0.037	1.794	-20.622	36.262
10	Textile Spinning	3.089	2.996	0	62.190	0.026	1.903	-26.750	58.326
			Pa	anel B (COV	'ID Time)				
		CSAD					R _m		
	All Sectors (PSX)	1.927	0.625	1.002	5.164	-0.039	0.997	-3.384	4.679081
1	Automobile Parts & Accessories	1.696	0.896	0.315	4.816	0.053	3.081	-121.603	86.914
2	Cement	1.837	0.820	0.569	4.449	-0.146	2.201	-7.624	7.531
3	Chemicals	2.073	0.743	0.671	4.717	-0.045	1.463	-5.256	6.728
4	Food & Personal Care Products	1.721	0.726	0.394	4.724	0.006	1.169	-3.714	4.697
5	Insurance	2.144	0.801	0.721	6.231	-0.002	1.119	-4.431	3.558
6	Oil & Gas Distributions	1.406	0.684	0.124	3.546	0.087	2.346	-7.241	7.552
7	Pharmaceuticals	1.633	0.728	0.369	4.049	-0.076	1.666	-5.627	7.291
		CSAD					R _m		
8	Synthetic & Rayon	1.124654	0.730	0	4.140	-4.100	0.786	-3.440	2.679
9	Sugar & Allied Industries	1.953	0.652	0.548	4.516	-0.037	1.079	-4.256	4.910
10	Textile Spinning	1.648	0.734	0.570	5.383	-0.060	0.822	-3.217	2.804

Table 1: Daily Descriptive Statistics of Cross-Sectional Absolute Deviation and Market Return

Table 1 shows daily descriptive statistics of CSAD and Rm of PSX and its sectors. Panel A is related to Pre-COVID time and Panel B with

COVID time. The data ranges from 1998 to 2021. The stock return dispersion is calculated as $CSAD = \frac{1}{N} \sum_{i=1}^{N} |R_{i,t} - R_{m,t}|$.

	Panel C	C (Pre-COVID)	
S. No.	Sectors	CSAD	$R_{m,t}^2$
	All Sectors (PSX)	-39.623***	-68.558***
1	Automobile Parts & Accessories	-46.668***	-70.379***
2	Cement	-43.964***	-54.981***
3	Chemicals	-49.968***	-55.632***
4	Food & Personal Care Products	-43.218***	-68.216***
5	Insurance	-47.798***	-63.772***
6	Oil &b Gas Distributions	-69.514***	-72.828***
7	Pharmaceuticals	-45.659***	-51.898***
8	Synthetic & Rayon	-57.337***	-68.692***
9	Sugar & Allied Industries	-28.967***	-58.824
10	Textile Spinning	-29.898***	-53.971***
	Panel D	(COVID Time)	
S. No.	Sectors	CSAD	$R_{m,t}^2$
	All Sectors (PSX)	-8.881***	-13.701***
1	Automobile Parts & Accessories	-9.688***	-9.601***
2	Cement	-7.438***	-12.926
3	Chemicals	-9.978***	-14.697***
4	Food & Personal Care Products	-11.347***	-15.626***
5	Insurance	-13.023***	-14.456***
6	Oil &b Gas Distributions	-12.877***	-11.111 ***
7	Pharmaceuticals	-9.008***	-12.812***
8	Synthetic & Rayon	-11.746***	-15.425***
9	Sugar & Allied Industries	-10.907***	-11.868***
10	Textile Spinning	-10.920***	-12.319***

Table 2: Daily Stationarity Results of Cross-Sectional Absolute Deviation (CSAD), Absolute Market Return $|R_m|$, and Market Return Squared (R_m^2)

Table 2 shows daily stationarity values of CSAD, $|R_m|$, and $(R_{m,l}^2)$. These values are calculated by applying ADF. The significance level is also mentioned. Panel C is related to Pre-COVID time and Panel D with COVID time. *Statistical significance at 10% level; **Statistical significance at 5% level; ***Statistical significance at 1% level.

insignificant, thereby demonstrating the absence of herding in these sectors. It can be inferred that during bearish market trends, low stock returns compel the investors to track the market by preceding their information to avoid further losses. These findings are in line with the international researches about pandemic and herd behavior. These studies noticed the presence of herd behavior during the pandemic and reported the impact of the COVID-19 pandemic on the herding prospects of investors (Allam et al., 2020; Arias, 2020; Asia, 2020; Chang et al., 2020; Kizys et al., 2020). Thus, the current research implies that herding is a sectoralbased phenomenon, and it is not the case with overall PSX.

5. Discussion and Conclusion

Globally COVID-19 pandemic has hit the economies of more than 100 countries. The pandemic has been considered a global disaster that has caused severe depression in the world. Economies have suffered severe losses. Various sectors of an economy, i.e., manufacturing, services, tourism, educational institutions, airline, banking, and many others, have to cope with such an uncertain situation. World Bank and IMF forecasted that countries would have to make serious efforts to uplift themselves. An economy can recover from the current crisis by taking quick and

			Overall Market			Up Market			own Market	
S. No.	Sector	α	γ,	Y ₂	α	۲ ^{up}	$\gamma_2^{ m UP}$	α	DOWN	γ_2^{DOWN}
	All Sectors (PSX)	1.886*** (48.06)	0.6542*** (7.43)	0.101*** (6.91)	1.601*** (25.74)	1.207*** (9.25)	0.081*** (14.58)	1.72*** (37.71)	0.810*** (7.57)	0.1671*** (5.27)
			R2		0.7	30	9.0	62	0.6	88
、	Automobile Parts & Accessories	0.451*** (9.07)	1.5697*** (31.83)	-0.004*** (-5.71)	0.5247*** (7.42)	1.509*** (20.67)	-0.001*** (-1.71)	0.4554*** (5.95)	1.5587*** (21.94)	-0.004*** (-8.01)
			R2		0.6	384	0.8	365	0.8	93
2	Cement	1.522*** (58.66)	0.336*** (10.03)	0.064*** (8.13)	1.458*** (36.90)	0.4297*** (6.74)	0.064*** (4.24)	0.1.384*** (46.28)	0.399*** (11.44)	0.0736*** (13.17)
			R		0.5	561	0.5	582	0.6	02
e	Chemicals	1.579*** (24.63)	0.5043*** (8.31)	-0.014*** (-1.17)	1.431*** (15.57)	0.660*** (5.50)	-0.027** (-1.46)	0.1.625*** (20.91)	0.387** (3.37)	0.0303 (1.03)
			R		0.5	502	0.5	330	0.4	66
4	Food & Personal Care Products	0.482*** (9.73)	1.760*** (25.48)	-0.005*** (-13.34)	0.339*** (4.71)	1.910*** (18.34)	-0.006*** (-12.04)	0.625*** (9.95)	1.607*** (18.57)	-0.003*** (-6,05)
			R ²		0.6	945	0.0	05	0.0	70
ъ	Insurance	0.948*** (35.21)	1.246*** (25.92)	0.020*** (3.91)	0.887*** (41.00)	1.328*** (51.50)	0.021*** (10.04)	0.887*** (22.42)	1.337*** (19.05)	0.018*** (2.29)
			R		0.7	783	0.7	77	0.7	86
9	Oil & Gas Distribution	0.879*** (18.48)	0.432*** (8.67)	0.018*** (15.09)	0.902*** (20.55)	0.456*** (9.96)	0.017*** (13.09)	0.746*** (10.27)	0.509*** (6.77)	0.017*** (9.30)
			R2		5.0	903	0.0	118	0.8	95
2	Pharmaceuticals	1.135*** (3.49)	1.327*** (12.76)	-0.001 (-1.11)	0.128 (0.70)	1.524*** (7.17)	-0.003 (-1.55)	0.010 (0.08)	1.675*** (11.63)	-0.006*** (-6.04)
			R		0.6	394	0.7	83	0.7	94
ω	Synthetic & Rayon	0.4408** (25.67)	1.679*** (14.45)	-0.008*** (-29.31)	0.470*** (14.68)	1.653*** (40.56)	-0.006** (-9.05)	0.398*** (7.11)	1.722*** (23.34)	-0.0100*** (-8.37)
			R^2		0.6	384	0.8	372	0.8	69
0	Sugar & Allied Industries	1.066*** (49.71)	1.500*** (11.76)	0.003*** (4.61)	0.9129*** (41.37)	1.631*** (63.50)	0.0007 (0.44)	0.988*** (16.98)	1.568*** (13.94)	0.0211 (1.10)
			R^2		0.6	331	0.0	03	0.8	76
10	Textile Spinning	1.203*** 10.48)	1.731*** (13.93)	-0.009*** (-5.28)	0.961*** (7.48)	2.016*** (14.57)	-0.0168*** (-7.59)	0.9851*** (15.94)	1.917*** (26.22)	-0.0205 (-1.31)
			ß		0.6	54	9.0	89	0.7	58
Table 3 de 1998 to 20	picts the daily regression 21. *Statistical significan	r estimates of PS toe at 10% level;	X and its sector t **Statistical signif	before COVID. The ficance at 5% level	ne results during uel; ***Statistical si	up and down mar ignificance at 1%	ket conditions are level.	also specified. T	he data ranges	from

Table 3: Daily Regression Results (Before COVID)

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Time)
COVID
Results (
Regression
Daily
Table 4:

			Overall Mark	et		Up Market			Down Market	
S. No.	Sector	α			α	у. ^{UP}	2 ^{UP}	α	1,1 DOWN	γ_2^{DOWN}
	All Sectors (PSX)	1.368*** (45.88)	0.8093*** (12.97)	-0.002 (-0.019)	1.330*** (36,97)	0.861*** (9.05)	-0.012 (-0.59)	1.410*** (34.12)	0.7391** (9.00)	0.0140 (0.53)
			R^2		0.83		0.862		0.860	
-	Automobile Parts & Accessories	0.7598*** 10.20)	0.9775*** (9.12)	-0.071** (-2.49)	0.951*** (7.38)	0.4804** (2.33)	0.083 (1.36)	0.690*** (8.44)	1.199*** (8.39)	-0.132*** (-3.96)
			R		0.628		0.560		0.893	
2	Cement	1.361*** (14.10)	0.4204** (6.62)	-0.0391*** (-3.88)	1.114*** (9.60)	0.5079*** (4.27)	-0.027*** (-1.40)	1.217*** (10.93)	0.5421*** (5.30)	-0.0375** (-2.25)
			R		0.88		0.426		0.464	
e	Chemicals	0.555*** (5.15)	1.487*** (15.24)	-0.001 (-0.72)	0.575*** (4.35)	1.524*** (12.94)	-0.002** (-1.89)	0.547*** (3.34)	1.433*** (9.80)	0.007*** (-0.34)
			R2		06.0		0.904		0.915	
4	Food & Personal Care Products	1.230*** (18.61)	0.5315*** (5.31)	0.028 (0.98)	1.143*** (13.60)	0.5809*** (4 19)	0.0183 (0.50)	1.268*** (15.31)	0.410** (2.30)	0.1327** (2.02)
			R		0.54		0.642		0.487	
ъ	Insurance	1.569*** (23.46)	0.5361*** (5.61)	0.102** (3.47)	1.492*** (16.39)	0.611*** (3.69)	0.081*** (1.46)	1.629*** (17.51)	0.478*** (3.80)	-0.124 (-4.11)
			R		0.620		0.645		0.604	
9	Oil &b Gas Distributions	1.019*** (11.25)	0.445*** (5.58)	-0.068***(- 5.31)	0.8677*** (7.93)	0.358*** (3.61)	-0.044** (-2.89)	1.091*** (8.46)	0.5609*** (4.48)	-0.091*** (-4.28)
			R ²		0.114		0.115		0.139	
2	Pharmaceuticals	1.332*** (14.59)	0.3179** (2.75)	-0.031 (-1.08)	1.136*** (9.75)	0.291** (2.29)	0.002 (0.12)	1.164*** (10.93)	0.7602*** (5.35)	-0.125*** (-4.55)
		,	۲ ۲		0.09		0.228		0.241	
ω	Synthetic & Rayon	0.5002** (8.96)	1.158*** (10.64)	-0.036 (-0.87)	0.543*** (6.77)	0.991*** (5.41)	0.100 (1.33)	0.443*** (6.27)	1.240*** (8.83)	-0.070*** (-1.55)
			Ъ		0.71		0.715		0.735	
6	Sugar & Allied Industries	1.465*** (24.48)	0.627*** (7.57)	-0.0008*** (-0.04)	1.474*** (15.19)	0.5600** (3.56)	0.0150*** (0.37)	1.431*** (16.50)	0.743*** (4.91)	-0.0270 (-0.59)
			R2		0.53		0.476		0.479	
10	Textile Spinning	1.046*** (26.85)	0.936*** (11.16)	0822** (2.42)	1.074*** (20.58)	0.8946*** (6.87)	0.0880 (1.54)	0.9917*** (19.26)	1.030*** (8.46)	0.072*** (-1.52)
			Ъ		0.82		0.812		0.843	
Table 4 d from Janu *Statistica	epicts the daily regression estarty 2020 to March 2021.	timates of PSX *Statistical sign	and some of it: ificance at 5% I	s sectors during (level; ***Statistica	COVID time. The r	esults during up an % level.	d down market co	nditions are als	so specified. Th	e data ranges

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effective measures to reduce the widespread of the virus, limiting unemployment, and easing financial pressures (Elliott, 2020). The economy of Pakistan is fragile indeed, and it was in the recovery phase since the happening incident of this disease. Experts are anxious concerning the slow recovery process of the economy. Pakistan's economy is shrinking, unemployment is rising, and various sectors are in crisis.

The stock market of Pakistan has faced ping pong effects from January 2020 to date. PSX has met a combination of bullish and bearish trends. Market Halt and some other measures have been employed to keep the performance of PSX at the desired track. Moreover, efforts have been made to improve the performance of PSX even when the global economies are struggling to keep themselves protected from the devastating effects of the pandemic.

The current research has attempted to examine the herding prospects of investors before the pandemic and the time covering the pandemic. The findings revealed the absence of herding in the PSX during both periods. Even authors could not detect herding signs during the extreme high and low market conditions, i.e., bullish and bearish. Moreover, very limited sectors of PSX have shown signs of herding before COVID-19. Above all, as far as pandemic time is concerned, strong herding effects have been observed in many sectors of PSX. It asserts that panic market conditions have inclined investors of these specific sectors to follow the decisions of other knowledgeable investors. Besides, investors did so to protect themselves from further losses.

The current research has some implications for individual investors. Herding is an essential aspect of financial markets which can be controlled, although its effects cannot be eliminated permanently. The valuable knowledge transmissions on the part of regulators can guide investors to deal with such behavior. For transparent valuation, investors must be concerned about the herding at the time of selection of securities. Investors must be properly guided by listed entities in the form of detailed information during panic market conditions to be aware of the risky nature of their investments.

Future researchers can use the findings of this research to make significant contributions to the literature. Future researchers can explore the herding phenomenon in all sectors of PSX during the pandemic, as herding is more likely to exist at the sectoral level. The prospective researchers can make a comparative study of the said variables in the South Asian group. Moreover, they can conduct exploratory research to have an in-depth idea about the impact of the pandemic on the investor's psychology by collecting real-time data (interviews).

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