Impact of Covid-19 on Investors Herding Behavior: Evidence from Stock Market

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Abstract:

The purpose of this research was to use a descriptive and causal-comparative approach to analyze herding behavior in the Nepalese stock market during the COVID-19 epidemic. The study employed a regression model and a cross-sectional standard deviation (CSSD) index to evaluate the herding tendency. The investigation covers a significant time period from January 1, 2018, to February 28, 2023, and involves a substantial number of observation sessions totaling 1103. It appears that there is currently no evidence to suggest that herding behavior has occurred before, during, or after the COVID-19 pandemic. This study indicates that market participants were making independent decisions based on their own analysis and assessment of the situation during the pandemic, rather than relying on the actions or decisions of others.

Keywords: *Herding Behavior, Nepalese Stock Market, Independent Choices, Market Performance, Market Stability, Covid-19*

1. Introduction

Herding behavior occurs when individuals make desicion based on peer pressure rather than facts and study (Chang & Lee,2020). According to Lorenz et al. (2011), herding behavior can improve interpersonal relations and group decision-making. Such actions might increase market volatility and inefficiency, as well as pose structural concerns to the financial industry (Khemmarat, 2019). Both positive and negative consequences on the economy and social circumstances can result from people following the mob or

bigger groups of individuals (Banerjee, 1992; Chen et al., 2018; Cont, 2001). Herding behavior happens when members of a group all change their minds on something at the same moment in response to fresh information (Bikhchandani & Sharma, 2001). Because of this, it's critical to comprehend the causes and implications of herding behavior in order to minimize negative consequences and maximize favorable ones (Chang & Yu, 2020). According to Banerjee (1992), when consumers lack sufficient knowledge, they may make poor decisions, follow the opinions of others, or place undue importance on popular opinion without considering their own information. According to Choe et al. (1999) and Kaminsky & Schmukler (1999), this conduct is associated with financial issues. It may have a significant impact on the safety and effectiveness of financial markets. The COVID-19 pandemic has exerted a substantial adverse influence on the worldwide financial markets and on consumer expenditure patterns.

Studies have found evidence of herding behavior in various stock markets, including Istanbul, Philippine, Chinese and other markets (Christie & Huang, 1995; Gleason et al., 2003; Demirer & Kutan, 2006; Kapusuzoglu, 2011; Jlassi & Bensaida, 2014; Amirat & Alwafi, 2020; Rahman & Ermawati, 2020; Banerjee, 1992; Choe et al., 1999; Kaminsky & Schmukler, 1999; Scharfstein & Stein, 1990; Mnif et al., 2020). Overall, depending on the situation, herding behavior may be both advantageous and detrimental. It can make individuals feel included and secure in a group, but it can also result in irrational choices and make it more difficult for people to express alternative viewpoints. The impact of COVID-19 on the herding behavior of investors in financial markets has not been extensively researched, as noted by Mnif et al. (2020).

In the Nepalese financial sector, there has been a notable occurrence of significant fluctuations in the NEPSE index. This phenomenon may be attributed to the tendency of consumers to adhere to the actions of others, commonly referred to as herd behavior. The COVID-19 pandemic has exerted a substantial adverse influence on the worldwide financial markets and on the expenditure patterns of individuals. Hence, it is imperative to comprehend the prevalence of herding behavior in the financial sector of Nepal, its underlying factors, and its impact on market performance and security.

2. Literature Review

Academic researchers have extensively examined the phenomenon of herding behavior in financial markets. Numerous academic studies have documented the occurrence of herding behavior, while others have produced uncertain outcomes. Christie and Huang

(1995) identified the existence of herding behavior through the utilization of cross-sectional standard deviation (CSSD) computation and the incorporation of market stress as dummy variables. Nonetheless, the methodology employed by Gleason et al (2003) failed to reveal any instances of herding behavior in the European the future market. Demirer and Kutan's (2006) study yielded no indications of herding conduct in the Chinese stock market, whereas Kapusuzoglu's (2011) research revealed the contrary in the Istanbul Stock Exchange. According to Jlassi and Bensaida's (2014) research, there was a rise in herding behavior during the subprime crisis as evidenced by the CSSD and CSAD models. The study conducted by Ramadan (2015) employed regression analysis to detect the presence of herding behavior and an adverse correlation between CSAD and market portfolio return. Amirat and Alwafi's (2020) research findings indicate a noteworthy association between herding behavior and the Bloomberg consumer comfort index. Similarly, Rahman and Ermawati (2020) observed the occurrence of herding behavior in the Philippine stock market during periods of spikes in the stock market index.

In light of the persistent COVID-19 pandemic, it is imperative to conduct research on its influence on investment patterns within financial markets. Notwithstanding the limited availability of scholarly literature on the topic, an inquiry has been conducted to examine the occurrence of herding behavior in the Nepalese stock markets during the COVID-19 pandemic.

The objective of this research is to make a scholarly contribution to the existing body of literature on herding behavior in financial markets and to enhance comprehension of investment behavior in periods of uncertainty. The extant literature underscores the significance of investigating herding behaviour in financial markets and advocates for additional scholarly inquiry in this domain.

2.1 Conceptual Foundation

The Efficient Market Hypothesis (EMH) posits that stock prices incorporate all relevant data, including economic fundamentals such as inflation, interest rates, and economic development, as per the Classical Asset Pricing Theory (Ryu et al., 2016; Iyke & Ho, 2020). The theoretical framework posits that investors who are rational solely engage in trading activities that are grounded in fundamental analysis, and any deviations from the intrinsic values are transient in nature.

Research in the field of behavioral finance has demonstrated that the sentiments and trading behaviors of individuals involved in the market can exert a substantial impact on the valuation of assets, resulting in deviations from the conventional theory of asset pricing. The study conducted by Brown and Cliff (2004) revealed that the trading volume and stock returns are influenced by the investor sentiment. The study conducted by Greenwood and Shleifer (2014), demonstrated that investor demand is influenced by sentiment, which in turn affects stock prices and trading volume.

Asset pricing is subject to the influence of diverse trading behaviors, such as herding behavior, abnormal trading behavior, and crowded trading (Kelley and Tetlock, 2013; Yao et al., 2014). The phenomenon of herding behavior is commonly observed in financial markets, whereby investors tend to emulate the actions of their counterparts instead of engaging in autonomous analysis. The aforementioned conduct has the potential to result in momentum trading and price bubbles, thereby giving rise to divergences from fundamental values (Iyke, 2020b).

Notwithstanding the presence of market inefficiencies, economic fundamentals continue to exert a substantial influence on the pricing of assets. According to Ryu et al. (2016), there exists empirical evidence that indicates the continued relevance of fundamental analysis in the prediction of long-term returns. The utilization of economic fundamentals can aid in the elucidation of divergences from the classical asset pricing theory and can facilitate the identification of lucrative investment prospects for investors.

3. Research Methodology

The study utilized a descriptive and causal-comparative research design to examine herding behavior within the stock market of Nepal. The present study examines the phenomenon of herding behavior in the context of COVID-19 intervention. The global dissemination of COVID-19 rumors began in December 2019, following the first reported case of COVID-19 in Wuhan, China on January 12, 2020.

The Nepal Stock Exchange (NEPSE) calculate the market index by weighting the individual script traded in the NEPSE. There are 84 script were traded as A category stock in Nepal Stock Exchange (NEPSE). Out of them 24 stock has the problem in data, some have after merger issue and some stock are traded during and after COVID period so such 24 stocks are excluded from the sample. Out of 84 A category script

(stock) 60 stock's price were downloaded and after eliminating non-trading days there are 1103 observation period from Jan-1-2018 to Feb-28-2023.

Sample Period

Duration	Intervention	Observation
Jan/01/2018 to Nov/28/2019	Before COVID Intervention	378
Dec/01/2019 to Dec/29/2021	COVID Intervention	446
Jan/01/2022 to Feb/28/2023	After COVID Intervention	279
Total Observation		1103

The return of individual stock and market return were calculated by using closing price difference formula. After calculating the individual and market return, the CSSD was calculated and CSSD was also measure using regression under the extreme market return by using dummy variables.

3.3.1 Estimation of Returns

Stock price disparities were used to determine the rate of return: the closing price at time t minus the closing price at time t-1 was divided by the closing price at time t (Smith,2021).

$$R_{i,t}/R_{m,t} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Where $R_{i,t}$ is the closing-price-difference-based return on investment for stock 'i' at time 't'. The stock closing price at time 't' is denoted by P_t, whereas the stock closing price at time 't - 1' is denoted by P_{t-1}.

3.3.2 Cross Section Standard Deviation

Christie & Huang (1995) suggest the following formula to calculate the cross-sectional standard deviation.

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

Where, $CSSD_t$ is the cross-sectional standard deviation at time 't'. The $R_{i,t}$ is the return on stock calculated by daily closing price differences of prices of individual stock. $R_{m,t}$ is the return on NEPSE calculated by using daily closing price differences of NEPSE index.

Where $CSSD_t$ is the cross-sectional standard deviation at time 't'. A stock's return, denoted by $R_{i,t}$, is the difference between its opening and closing prices on any given day. The return on NEPSE, denoted by $R_{m,t,}$ is derived from the daily closing price differential of the NEPSE index.

3.3.3 Herding Behavior under Higher and Lower Returns

Christie & Huang (1995) studied and develop the CSSD model by using regression analysis using extreme return effect (i.e. dummy variable of return extreme or not).

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

Where, D_t^U = 1, if the market return on day t lies in the extreme upper tail of the return distribution, equal to 0 otherwise. D_t^L = 1, if the market return on day t lies in the extreme lower tail of the return distribution and equal to 0 otherwise.

3.3 Data Collection Instruments

The daily closing prices of A category stock are calculated from the NEPSEALPHA website. After collecting daily prices, the data were filled in the MS Excel and Cross-Sectional Standard Deviation (CSSD) were calculated as suggested by Christie & Huang (1995). Similarly, the CSSD were calculated by using extreme return case (i.e. higher and lower return).

List of Securities in Nepal Stock Exchange

S.N.	Name of Securities	Script Code	S.N.	Name of Securities	Script Code
1	Nepal SBI Bank Ltd.	SBI	43	Sunrise Bank Ltd.	SRBL
2	Asian Life Insurance Company Ltd.	ALICL	44	Shikhar Insurance Co. Ltd.	SICL
3	Arun Valley Hydropower Development Co. Ltd.	AHPC	45	Sana Kisan Bikas Bank Ltd.	SKBBL
4	Butwal Power Company Ltd.	BPCL	46	Prudential Insurance Co. Ltd.	PICL
5	Chilime Hydropower Company Ltd.	CHCL	47	Prabhu Bank Ltd.	PRVU
6	Neco Insurance Co. Ltd.	NIL	48	Nepal Doorsanchar Company Ltd.	NTC
7	NLG Insurance Co. Ltd.	NLG	49	Prime Commercial Bank Ltd.	PCBL
8	Goodwill Finance Co. Ltd.	GFCL	50	Pokhara Finance Ltd.	PFL
9	Muktinath Bikas Bank Ltd.	MNBBL	51	Shangrila Development Bank Ltd.	SADBL
10	Nepal Bank Ltd.	NBL	52	Sanima Bank Ltd.	SANIMA
11	Ngadi Group Power Ltd.	NGPL	53	Siddhartha Bank Ltd.	SBL
12	Vijaya Laghubitta Bittiya Sanstha Ltd.	VLBS	54	Swabalamban Laghubitta Bittiya Sanstha Ltd.	SWBBL
13	Chhimek Laghubitta Bikas Bank Ltd.	CBBL	55	Standard Chartered Bank Ltd.	SCB
14	Agricultural Development Bank Ltd.	ADBL	56	Shine Resunga Development Bank Ltd.	SHINE
15	Citizen Investment Trust	CIT	57	Nerude Laghubitta Bittiya Sanstha Ltd.	NLBBL
16	Soaltee Hotel Ltd.	SHL	58	Nepal Life Insurance Co. Ltd.	NLIC
17	Central Finance Co. Ltd.	CFCL	59	Nirdhan Utthan Laghubitta Bittiya Sanstha Ltd.	NUBL

18	Citizen Bank International Ltd.	CZBIL	60	RMDC Laghubitta Bittiya Sanstha Ltd.	RMDC
19	Everest Bank Ltd.	EBL	61	NMB Bank Ltd.	NMB*
20	Excel Development Bank Ltd.	EDBL	62	Manakamana Smart Laghubitta Bittiya Sanstha Ltd.	MKLB*
21	First Micro Finance Development Bank Ltd.	FMDBL	63	Nepal Investment Mega Bank Ltd.	NIMB*
22	Garima Bikas Bank Ltd.	GBBL	64	Himalayan Bank Ltd.	HBL*
23	Grameen Bikas Laghubitta Bittiya Sanstha Ltd.	GBLBS	65	Oriental Hotels Ltd.	OHL*
24	Global IME Laghubitta Bittiya Sanstha Ltd.	GILB	66	Himalayan Everest Insurance Ltd.	HEI*
25	Gurkhas Finance Ltd.	GUFL	67	Prabhu Insurance Ltd.	PRIN*
26	Kumari Bank Ltd.	KBL	68	Shree Investment Finance Co. Ltd.	SIFC*
27	Janaki Finance Ltd.	JFL	69	Guheshowori Merchant Bank & Finance Co. Ltd.	GMFIL*
28	ICFC Finance Ltd.	ICFC	70	Global IME Bank Ltd.	GBIME*
29	Jyoti Bikas Bank Ltd.	JBBL	71	Prime Life Insurance Company Ltd.	PLIC*
30	Janautthan Samudayic Laghubitta Bikas Bank Ltd.	JSLBB	72	Surya Jyoti Life Insurance Company Ltd.	SJLIC*
31	Kamana Sewa Bikas Bank Ltd.	KSBBL	73	Gurans Life Insurance Company Ltd.	GLICL*
32	Laxmi Bank Ltd.	LBL	74	Multipurpose Finance Company Ltd.	MPFL*
33	Laxmi Laghubitta Bittiya Sanstha Ltd.	LLBS	75	Summit Micro Finance	SMFDB*

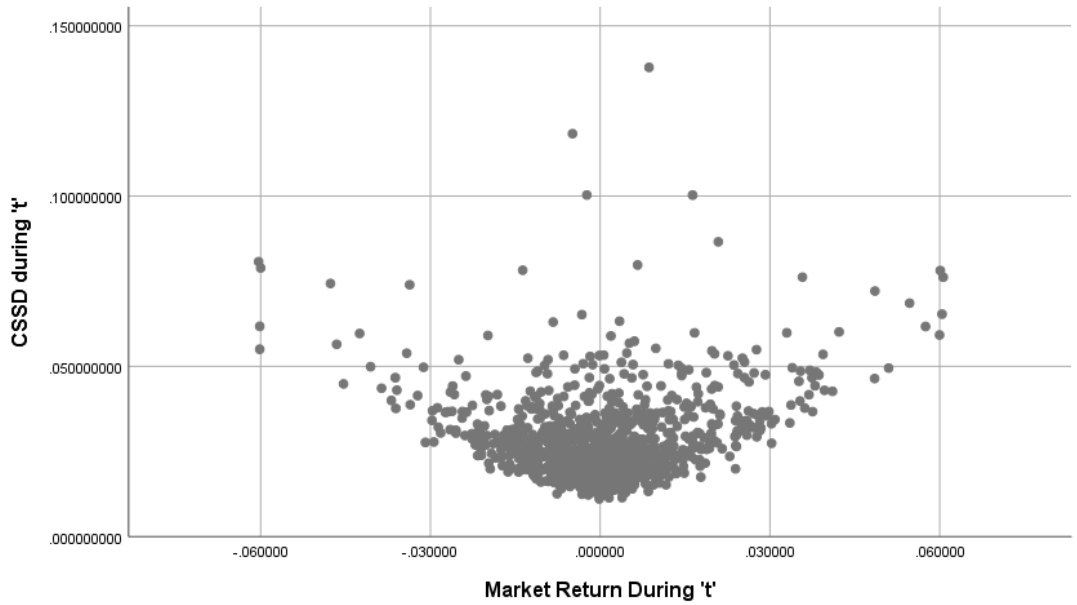
				Development Bank Ltd.	
34	Machhapuchhre Bank Ltd.	MBL	76	Sindhu Bikas Bank Ltd.	SINDU*
35	Mero Microfinance Bittiya Sanstha Ltd.	MERO	77	Naya Sarathi Laghubitta Bittiya Sanstha Ltd.	NSLB*
36	Mahalaxmi Bikas Bank Ltd.	MLBL	78	Mithila LaghuBitta Bittiya Sanstha Ltd.	MLBBL*
37	Nabil Bank Ltd.	NABIL	79	Ridi Power Company Ltd.	RIDI*
38	NIC Asia Bank Ltd.	NICA	80	Mirmire Laghubitta Bittiya Sanstha Ltd.	MMFDB*
39	National Life Insurance Co. Ltd.	NLICL	81	Kisan Laghubitta Bittiya Sanstha Ltd.	KLBSL*
40	NMB Microfinance Bittiya Sanstha Ltd.	NMBMF	82	Suryodaya Womi Laghubitta Bittiya Sanstha Ltd.	SWMF*
41	National Microfinance Bittiya Sanstha Ltd.	NMFBS	83	Samata Gharelu Laghubitta Bittiya Sanstha Ltd.	SMATA*
42	RSDC Laghubitta Bittiya Sanstha Ltd.	RSDC	84	Mahuli Laghubitta Bittiya Sanstha Ltd.	MSLB*

Source: Nepal Stock Exchange (NEPSE)

*: Companies listed after 2018 or script having large non-trading days.

4. Analysis and Findings

4.1 Portfolio returns in the market and their correlation with cross-sectional standard deviation



(Fig 1. Authors Calculation)

Fig. 1. Relationship between the cross-sectional standard deviation ($CSSD_t$) and market portfolio return (R_m) for the period of Jan-1-2018 to Feb-28-2023.

The u-shaped (quadratic) relationship is found between the cross-sectional standard deviation ($CSSD_t$) and market return (R_m). The quadratic relation means increase in market return decreases the cross-sectional standard deviation index and decreasing in market return increases that herding index (i.e. $CSSD_t$). Such inverse relationship exists when the market return in negative, if market return is positive then the relationship becomes positive.

4.2 Descriptive Statistics of CCSD and Market Portfolio Return

Table 1
Descriptive statistics and Pearson correlation between daily return dispersion measure ($CSSD_t$) and market portfolio return (R_m)

	Observation	Mean	Standard Deviation	Min.	Max.	$CSSD_t$
$CSSD_t$	1103	0.028322	0.012247	0.011088	0.060612	1
R_m	1103	0.000336	0.014344	-0.060363	0.060612	0.120975**

**. P-value < 0.01

Table 1 contains descriptive statistics along with the calculation of the correlation coefficient. Calculations were performed on the mean, standard deviation, minimum and maximum of cross-sectional standard deviation and market return. The average statistics of cross-sectional standard deviation is 0.028322, with a standard deviation of 0.012247. Likewise, the average market return is 0.000336 and the standard deviation is 0.014344. The correlation coefficient between cross-sectional standard deviation and market return is 0.120975, which is statistically significant at the 1% level (P-value 0.01).

Table 2
Portfolio Return Statistics in Different Sample Periods

	N	Mean	Standard Deviation	ADF	A	B	C
$(A)R_{Before\_Covid}$	378	-0.000715	0.016029	-4.89**	1		
$(B)R_{Druing\_Covid}$	446	0.001975	0.014771	-9.19**	0.008	1	
$(C)R_{After\_Covid}$	279	-0.000865	0.010531	-14.56**	-0.034	-0.055	1

*. P value < 0.05
**. P-value < 0.01

Table 2 shows the mean, standard deviation, Augmented Dickey – Fuller (ADF) test and correlations. The average portfolio returns before and after COVID is negative and during the COVID time period the portfolio return is positive. This indicate that the portfolio return is higher than before and after COVID time period. Standard deviation

of before COVID period is high which make more volatile portfolio return and which is very low after COVID time period. There is positive relationship between COVID time period and before COVID time period but not statistically significant. Similarly, the COVID time period and after COVID period are negatively related i.e. correlation coefficient is negative but the relationship is not statistically significant. All correlation coefficient presented in table 3 are statistically insignificant, so, the strong arguments regarding the relationship cannot be established.

Augmented Dickey – Fuller (ADF) tested to check stationarity in the data set and all the ADF test are significant at 1% level of significant. This means there is no problem in data stationarity and the time series data does not have unit root.

Table 3
CSSD statistics in different sample periods

	N	Mean	Standard Deviation	ADF	*A*	*B*	*C*
$(A)CSSD_{Before\_C}$	378	0.026969	0.012249	-17.77**	1		
$(B)CSSD_{Druing\_C}$	446	0.031857	0.012657	-3.31*	0.054	1	
$(C)CSSD_{After\_Co}$	279	0.024496	0.009869	-12.55**	-0.072	0.055	1

***.** P value < 0.05
******. P-value < 0.01

Table 3 shows the mean, standard deviation, Augmented Dickey – Fuller (ADF) test and correlations. The average cross-sectional standard deviation is positive for all due to square deviation. The average cross-sectional standard deviation at the time of COVID is very high i.e. 0.031857. Herding index during COVID time period is very fluctuated indicated by standard deviation of CSSD index (i.e. 0.012249). All correlation coefficient between different time period are all statistically insignificant.

Augmented Dickey – Fuller (ADF) tested to check stationarity in the data set and all the ADF test are significant. ADF test in CSSD before and after COVID data set are significant at 1 percent level of significant and CSSD during COVID time period is

statistically significant at 5 percent level of significant. This means there is no problem in data stationarity and the time series data does not have unit root.

4.3 Regression result of extreme market dummies on CSSD

Table 4
Regression result of extreme market dummies on Cross-Sectional Standard Deviation (CSSD) at 1% and 5% extreme return

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

	Extreme 1% Index Return					Extreme 5% Index Return				
Period of Study	α	β_1	β_2	Model (Sig.)	R-Square	α	β_1	β_2	Model (Sig.)	R-Square
Before COVID	0.027*	0.030*	0.018**	0.000	0.254	0.025*	0.018*	0.014*	0.000	0.150
During COVID	0.031*	0.041*	0.038*	0.000	0.414	0.030*	0.022*	0.019*	0.000	0.234
After COVID	0.024*	0.019*	0.019*	0.000	0.054	0.023*	0.014*	0.007*	0.000	0.114

Note: Model (Sig.) is the significant value (p-value) of ANOVA. D_t^U is 1 if the index return is greater than 1% or 5% otherwise 0. Similarly, D_t^L is 1 if the index return is greater then 1% or 5% otherwise 0.

*. P-value < 0.01 (Statistically significant at 1% level of significant)

**. P-value < 0.05.

Regression results are presented in table 4 which measures the impact of dummy variable (extreme market return) on the cross-sectional standard deviation (CSSD). The regression analysis was conducted in extreme return condition of 1% and 5%. Similarly, three-time period returns were observed i.e. before COVID, during COVID and after COVID. The main concern for the study is to analyze the herding presence at the time of COVID-19. The R-square of the model is 0.254 which means 25.4 percent determination of CSSD by independent variable but the independent variable is dummy variable in binary form (0 and 1) so the r-square is not so important here. The model fit was analyzed by the ANOVA test and all the p-values of the ANOVA are statistically significant at 1 percent level of significant (i.e. p-value < 0.01).

As per the Christie & Huang (1995) if all beta coefficients are positive and statistically significant we can conclude there is no existence of herding behavior. All the beta coefficients of regression model are positive and all coefficient are statistically significant at 1 percent level of significant. Only the D_t^L has beta coefficient 0.018 which is positive and statistically significant at 5 percent level of significant. This implies there is no herding behavior in the time of COVID-19. Similarly, for the robust check the return before and after COVID-19 are also analyzed and there is all positive beta coefficient and all are statistically significant at 1 percent and 5 percent level of significant so there is no presence of herding behavior in before and after COVID-19.

5. Findings

Herding behavior is the tendency for individuals to imitate the actions of a larger group instead of making independent decisions based on their own judgment. This behavior can occur in a variety of settings, such as financial markets and social situations. Herding behavior in the financial markets can contribute to market bubbles or collapses. This study's primary objective is to analyze herding behavior during the COVID-19 period using the cross-sectional standard deviation (CSSD index) and regression model created by Christie & Huang (1995).

Herding behavior has been observed in Christie & Huang (1995), Kapusuzoglu (2011), Jlassi & Bensaida (2014), Ramadan (2015), and Rahman & Ermawati (2020) studies. Similarly, Gleason et al. (2003), Demirer & Kutan (2006), and Amirat & Alwafa (2020) discovered that there is no herding behavior in the financial markets of various nations. This investigation determined that there was no herding behavior during the COVID-19 period. As determined by the Christie & Huang (1995) regression model for measuring extreme market return utilizing dummy variables, herding behavior does

not exist. This study agrees with the findings of Gleason et al. (2003), Demirer & Kutan (2006), and Amirat & Alwafi (2020), but disagrees with those of Christie & Huang (1995), Kapusuzoglu (2011), Jlassi & Bensaidi (2014), Ramadan (2015), and Rahman & Ermawati (2020).

On the basis of the regression results presented, it is possible to conclude that there is no evidence of herding behavior during the COVID-19 pandemic, as well as before and after it. During the pandemic, market participants made independent decisions based on their own analysis and judgment, as opposed to uncritically following the actions or decisions of others.

6. Limitation of the Study

It's important to note that only A class stocks from the Nepal Stock Exchange (NEPSE) were used in the data study, and only 60 of the 84 companies had data available due to things like mergers, acquisitions, and a lot of days when they didn't trade. Secondary data analysis is a popular way to find herding behavior, but it's important to remember that herding behavior is a complicated and not just quantitative process. A more qualitative inquiry could help us learn more about the reasons and ways of thinking that market players use to make choices. Because of this, it might be helpful for future studies to use qualitative methods, like polls or conversations, to add to the analysis of quantitative data.

7. Recommendation for Future Studies

Future research can build on this study by using different herding measures, such as the cross-sectional absolute deviation (CSAD), the cross-sectional correlation (CSC), or the cross-sectional dispersion (CSD) indices, to confirm that there was no herding behavior in the Nepalese financial market during the COVID-19 pandemic. Also, looking at how market features like liquidity, volatility, and trade volume affected the lack of herding behavior during the pandemic could give us more information. Also, re-doing this study with a larger sample size and over a longer period of time would improve the results and give us a better idea of how long the lack of herding behavior in the Nepalese financial market has been going on for.

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