HERDING DURING COVID-19 PANDEMIC: AN EMPIRICAL STUDY IN VIETNAMESE STOCK MARKET

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ABSTRACT

This paper investigates herd behavior in the Vietnam stock market under the impacts of the COVID-19 pandemic. Using Chang et al.'s (2000) method on two sets of daily and weekly trading data ranging from January 2018 to December 2021, we provide evidence about the presence of herd behavior during the global health crisis but not in the period prior to the outbreak of COVID-19. In addition, the regression analysis of a modified model implies that the tendency of herding among investors in the Vietnam stock market became more prevalent as the pandemic became more severe and the government measures to mitigate the pandemic turned out to be more stringent. These findings suggest that Vietnamese regulators may help to stop or mitigate the impact of any potential stock market crashes and that new investors need to acquire more knowledge about the market and skills for investing.

Keywords: herd behavior, Vietnam, COVID-19

INTRODUCTION

The COVID-19 outbreak at the beginning of 2020, which quickly became a widespread concern for public health, also adversely affected the global economy (Phan & Dam, 2023; Gosh, 2022). Many studies have recently been conducted that focus on the herding component

of investor behavior during the pandemic. Some of them found that the phenomenon existed throughout the crisis. Others, although very few, aimed to find out whether the outbreak of the disease made herding more pronounced, and the findings varied among the countries whose stock markets were examined (see Aslam et al., 2021; Espinosa-Méndez & Arias, 2020; Fang et al., 2021; Luu et al., 2020; Mishra et al., 2021). It is notable, however, that there has been a lack of such studies conducted in the context of frontier markets despite a number of their unique characteristics. On the one hand, frontier markets are often attractive to investors due to their role in portfolio diversification and significantly higher performance (Girard & Sinha, 2008; Berger et al., 2011). On the other hand, potential risks caused by the lack of liquidity and transparency in the markets may hinder such benefits (Andrikopoulos et al., 2016). In the context of such an unforeseen circumstance as the COVID-19 outbreak, those risks could be considerably increased, resulting in unique phenomena such as herd behavior.

Thus, the main objective of this paper is to address two research questions: (1) Was there any evidence of herd behavior in the Vietnam stock market during the COVID-19 pandemic and the previous period? and (2) If herd behavior existed during the pandemic period, was its intensity changed due to a change in the severity of pandemic and the level of restriction in government policies implemented to handle it? The results of this study can help to bridge a gap in the current literature on herding. They also provide useful implications for policymakers, stock market regulators and participants in Vietnam to help them to take rational actions after this global health crisis and even during other future pandemics.

The rest of the paper is structured as follows. Section 2 briefly reviews the related literature. Section 3 describes the research method and the study samples. The findings and discussions are reported in Section 4. Finally, Section 5 concludes the paper.

LITERATURE REVIEW

"Herding" refers to the act of imitating another's actions and/or basing judgments on those of others (Spyrou, 2013). As the COVID-19 virus rapidly spread all over the world, several studies were conducted to investigate how the herd behavior of investors would change as a result. Wu et al. (2020) utilized the tests proposed by Christie & Huang (1995) and Chang et al. (2000) on a sample that consisted of nearly 2900 A-shares listed on the Shanghai and Shenzhen Stock Exchanges. They found that herding was significantly lower than usual during COVID-19 and more pronounced for upside market movements, lower market trading volume, and lower market volatility. Yuan (2021) also investigated herd behavior among investors in the Chinese A-share market. He pointed out that herding became more intensive after the outbreak of COVID-19, while herding was more evident in the down phase than the up phase of the market. Stocks of firms operating in transportation, leasing, business, and cultural products experienced intensified herding effects during COVID-19, while those in the manufacturing and real estate industries suffered less. Luu et al. (2020) investigated the existence of herding on an industrial scale during the period of two pandemics (H1N1 and COVID-19) in the Vietnam and Taiwan stock markets and showed that investors herded in some industries even more strongly than in the whole market. Moving onto the Indian market, Mishra et al. (2021) reported the presence of herd behavior at the industry level in the National Stock Exchange (NSE) during bull and bear market conditions.

Regarding stock markets in European countries, the result of the Espinosa-Méndez et al. (2020) paper showed that the COVID-19 pandemic made herd behavior on five developed European primary stock markets more significant. Similarly, Fang et al. (2021) found that after the outbreak herding existed in five out of six Eastern European markets and was more prominent compared to the previous period. Herding among investors in the European and US stock markets, which was primarily due to non-fundamental information, was also reported by Pochea (2021). Furthermore, he found that the rise in the intensity of herd behavior after the outbreak was partly due to the uncertainty directly associated with the pandemic. Using the measure "self-similarity intensity", Aslam et al. (2021) investigated the change in herding of six stock markets across Europe and Asia on a quarterly basis. They concluded that herding in European markets was more intensified than that in Asian ones and was closely associated with COVID-19 waves. By combining Chang et al.'s (2000) model with static and rolling window

methods, Bogdan et al. (2022) compared the intensity of herding in 15 different European stock markets under the impact of the pandemic. The findings revealed that herd behavior did, in fact, exist during the pandemic period and was most prevalent in emerging markets, followed by frontier and developed ones. They suggested that the higher liquidity and volatility among the emerging market group, compared to the other two, may have account for what had been observed.

Herding in other financial markets all over the world has also been examined. Espinosa-Méndez & Arias (2021), based on a sample consisting of 90 listed companies, reported an increase in the magnitude of herding in the Australian stock market. Ghorbel et al. (2022) showed that herding was present during the four waves of COVID-19, while transaction volume and the number of deaths resulting from the pandemic boosted herding behavior among developed and BRICS (Brazil, Russia, India and China) stock market indices. Remarkably, Kizys et al. (2020) tried to examine the impact of government response on the intensity of herding in stock markets of 72 countries. Despite the ambition, their paper fell apart as they examined how the changes in government response affected the return dispersions, which Chang et al. (2000) had referred to as not a measurement of herding.

Overall, researchers have attempted to examine a few aspects of herding during the COVID-19 pandemic. Most of those studies, however, have been conducted in the context of developed and emerging stock markets, and only a tiny portion of them concentrated on frontier markets. In addition, none of them had successfully addressed the question of how the state of the pandemic and the policy restrictions may have affect the intensity of herding. As a result, this study is conducted to fill the mentioned gap in the literature.

METHODOLOGY

Model for detection of herd behavior in stock market

The literature suggests two commonly used techniques for investigating the existence of herding. The first one, which was proposed by Christie & Huang (1995), based on the idea that individuals tend to follow the market consensus during the periods of extreme market movements, can be expressed as below:

$$CSSD_t = \alpha + \beta^L * D_t^L + \beta^U * D_t^U + \varepsilon_t \qquad (1)$$

CSSD is the cross-sectional standard deviation, which measures the dispersion of individual returns from the consensus one. In this model, D_t^L and D_t^U are equal to 1 if the market return on day t lies in the extreme lower and upper tail of the distribution; and are zero otherwise.

However, Christie and Huang's (1995) model has several inherent flaws in how they relate the occurrence of herding with the tail of the return distribution and disregard herding during normal market conditions. As a result, Chang et al. (2000) introduced another approach to overcome those issues. The simplest form of this model is illustrated as follows:

$$CSAD_t = \alpha + \gamma_1 |R_{m,t}| + \gamma_2 R_{m,t}^2 + \varepsilon_t \qquad (2)$$

Of which, $R_{m,t}$ is the return of the market capitalization-weighted portfolio on day t. Given that $R_{i,t}$ is the return of an individual stock i on day t and N is the total number of listed firms on the stock market, the cross-sectional absolute deviation, which is a measure of return dispersion, is calculated as:

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{n} |R_{i,t} - R_{m,t}| \qquad (3)$$

Being constructed in the same spirit as that of Christie and Huang (1995), this model suggests that the relationship between the market return and the return dispersions is linear and increasing in normal conditions. This relationship, however, does not hold when herding occurs during large price movements, as the dispersions must drop to reflect the convergence of individual returns to the market return. In other words, the dispersion is expected to increase until the absolute value of market returns reaches a specific point; after that, it should begin to fall as the market returns continue to rise. Therefore, a statistically significant negative value of γ_2 indicates that herding does exist in the stock market in a specific period.

Model for assessing the impact of COVID-19 pandemic and government response strictness on herd behavior

In order to investigate how the situation of the COVID-19 pandemic and the strictness of the government response to the pandemic affected the extent to which Vietnamese investors conducted herd behavior, a modified version of the aforementioned model is proposed in this

study.

$$CSAD_t = \alpha + \gamma_1 D_X |R_{m,t}| + \gamma_2(1 - D_X)|R_{m,t}| + \gamma_3 D_X R_{m,t}^2 + \gamma_4(1 - D_X)R_{m,t}^2 + \varepsilon_t \quad (4)$$

Of which, D_X is a dummy variable that represents the condition of the pandemic itself or the restriction in government response to the pandemic in a trading day. To be specific, two dummy variables, namely D_{DNC} and D_{DND}, are used as proxies for the condition of the COVID-19. These would equal 1 in trading day t if the number of newly confirmed cases and newly reported death cases resulted from COVID-19 of trading day t-1 is higher than that of the previous day (trading day t-2), respectively, and would receive a value of zero otherwise. Another set of variables, D_{STI} and D_{CTI}, is used to illustrate the strictness in the policies that the government imposed as measures to combat the pandemic. The way to define the value of those variables is similar to that of those pandemic ones. That is, the values of those in trading day t would equal 1 if the Stringency Index and the Containment Index, which are reported in the Oxford COVID-19 Government Response Trackers (OxCGRT), in trading day t-1 is higher than those of day t-2, and would be 0 otherwise.

To examine the effect of different conditions of the pandemic and the restriction in government response may have had on the intensity of herding, the Wald test for the equality of γ_3 and γ_4 conducted with the estimation of each model.

Data

In this study, the daily trading data of VNINDEX and all listed companies on the Ho Chi Minh Stock Exchange (HSX) between January 1, 2018 and December 31, 2021 is utilized. The data gathered for analysis is a balanced time-series dataset that contains 1,000 observations of market returns and dispersion. All the trading data was retrieved from the FiinPro database.

The data are also divided into two halves for the purpose of further investigating the impact of the pandemic and the government response on the degree of herding among investors. As the first case of COVID-19 in Vietnam was officially reported on January 23, 2020, the pre-COVID dataset is set to range between January 1, 2018 and January 22, 2020, while the COVID-19 sample is from January 23, 2020 to December 31, 2021.

Table 1: Descriptive statistics of $R_{m,t}$ and $CSAD_t$

		Mean	Std. Dev.	Maximum	Minimum	Skewness	Kurtosis
Panel A: Full sample							
Daily	$CSAD_t$	0.018389	0.003591	0.035199	0.011874	1.293296	4.963635
	$R_{m,t}$	0.000443	0.008338	0.046585	-0.052314	-0.978637	9.375101
Weekly	$CSAD_t$	0.041847	0.010890	0.112174	0.015538	2.156742	12.51902
	$R_{m,t}$	0.002411	0.028344	0.079994	-0.145450	-1.091763	7.016622
Panel B: Pre-COVID sample							
Daily	$CSAD_t$	0.017458	0.002965	0.034704	0.011874	1.590980	7.098378
	$R_{m,t}$	-0.000222	0.006415	0.029560	-0.032789	2.737198	12.43287
Weekly	$CSAD_t$	0.037383	0.006154	0.058522	0.019075	0.916565	5.438064
	$R_{m,t}$	0.000370	0.024565	0.055571	-0.091490	-0.743733	4.799783
Panel C: COVID-19 sample							
Daily	$CSAD_t$	0.019370	0.003920	0.035199	0.012112	0.996601	3.848789
	$R_{m,t}$	0.001144	0.009929	0.046585	-0.052314	-1.124606	8.225659
Weekly	$CSAD_t$	0.046573	0.012705	0.112174	0.015538	1.843319	10.07588
	$R_{m,t}$	0.004572	0.031844	0.079994	-0.145450	-1.318263	7.581581

This table lists descriptive statistics for the market returns ($R_{m,t}$) and the cross-sectional absolute deviations ($CSAD_t$) for the full sample that covers the period from January 01, 2018 to December 31, 2021 (Panel A). The descriptive statistics for those indicators of the two sub-samples is also reported in this table (Panel B and C). The full sample is divided into two smaller samples to represent the pre-pandemic and the pandemic period. As the first infected case in Vietnam was confirmed on January 23, 2020, the COVID-19 subsample is set to range between that day and December 31, 2021, while the pre-COVID subsample is from January 01, 2018 to January 22, 2020.

Table 1 provides a summary of statistics of $R_{(m,t)}$ and $⟦CSAD⟧\_t$ in the full sample as well as two sub-samples. It is clear that the mean values of $⟦CSAD⟧\_t$ are higher during the pandemic period. While those values obtained from two smaller daily subsamples do not deviate too far from that of the full dataset, the dispersion of the mean values of $⟦CSAD⟧\_t$ in two small weekly datasets from that of the full sample is much larger. Regarding the mean values of $R_{(m,t)}$, they were both low in the pre-pandemic period and became much higher during the COVID-19 period considering both daily and weekly datasets. Remarkably, the mean value of daily market returns during the pre-COVID period is negative before turning to a significant high and positive value after the outbreak of the COVID-19.

FINDINGS AND DISCUSSION

Detection of herd behavior in the Ho Chi Minh City Stock Exchange

Model (1) was first estimated to examine whether herd behavior did exist over the covered period and two sub-periods. In analyzing this model, both daily and weekly datasets were utilized. The estimated results, with robust standard errors, are presented in Table 2.

Table 2: Detection of herd behavior in Vietnam stock market

Frequency	α	γ_1	γ_2	R^2
Panel A: Full Period				
Daily	0.0157***	0.5550***	-4.8087***	0.5510
	(0.0001)	(0.0413)	(1.6628)	
Weekly	0.0368***	0.1396**	2.6325***	0.4820
	(0.0010)	(0.0512)	(0.4382)	
Panel B: Pre-COVID Period				
Daily	0.0155***	0.1396**	2.6325***	0.5870
	(0.0001)	(0.0512)	(0.4382)	
Weekly	0.0336***	0.1586**	1.5253*	0.4929
	(0.0008)	(0.0644)	(0.7575)	
Panel C: COVID-19 Period				
Daily	0.0162***	0.5267***	-4.7813**	0.5014
	(0.0002)	(0.0542)	(1.8976)	
Weekly	0.0409***	0.1255*	2.6811***	0.5186
	(0.0016)	(0.0772)	(0.5619)	

This table provides the estimation results of equation (2) with different timeframes. The full sample covers a period ranging from January 2018 to December 2021. The Pre-COVID period is between January 01, 2018 and January 22, 2020, and the COVID-19 period is from January 23, 2020 to December 31, 2022. Robust standard errors are reported in parentheses; ***, **, * denote significance at 1%, 5% and 10% level.

Source: Author's work.

No matter which sample, either the full period or both sub-period ones, was analyzed, the estimators for α and γ_1 in every scenario are positive and statistically significant at conventional levels regarding the daily datasets. This is also the case considering the weekly alternatives. The findings here are not surprising as they imply that, in case there is no presence of herding, the overall market return and the return dispersion of individual equities demonstrate a linear relationship, which is, in fact, in line with what the capital asset pricing model CAPM predicts[1].

Our main concern, the estimated γ_2, was

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[1] Capital Asset Pricing Model, or CAPM in short, considers the relationship between the expected return of an asset and the market risk (Sharpe, 1964). Chang et al. (2000)'s model was essentially developed based on the idea CAPM model, which led to the linear relationship between market return and the sum of deviation of securities from the market portfolio. However, the linear relationship proposed in both model only holds during the normal states of the market.

expected to be negative as discussed earlier to indicate that herding does exist during a specific examined period. Nonetheless, the results of the estimated γ_2 using daily datasets are mixed among scenarios. While estimators for γ_2 using the full dataset and the COVID-19 sample are both negative and significant at 1% and 5% respectively, that of the pre-COVID sample, surprisingly, is positive and statistically significant. These results suggest that herding among investors only appeared over the pandemic period but not the prior one. The presence of herding in the COVID-19 period is so prevalent that it became dominant over the whole examined period, resulting in the fact that the presence of herding was also confirmed when analyzing the full period dataset. The finding about the existence of herding during the COVID-19 pandemic is in line with several previous studies that had been conducted in other countries during this health crisis, such as those of Espinosa-Méndez et al. (2020), Espinosa-Méndez & Arias (2021), Fang et al. (2021), and Ferreruela & Mallor (2021).

On the other hand, the estimators for γ_2 obtained by analyzing all three weekly datasets are positive and significant at the conventional level. These results provide no evidence for the presence of herding in the Vietnam stock market when analyzing data collected on a weekly basis. In other words, herding among investors seemed not to be a long-lived phenomenon in the Vietnam stock market, which is in line with the conclusion made by Vo & Phan (2017).

The role of the COVID-19 pandemic and government policy strictness

Being aware that herding was only present during the pandemic period but not in the prior one, we further examined whether the degree of herding was affected by any factors associated with the pandemic and the government responses to it. Equation (4) was regressed with a number of dummy variables that represent the change in the severity of the pandemic day by day. To be more specific, two dummy variables, $DPRDNC_t$ and $DPRDND_t$ as discussed above, were used to illustrate how investors may perceive the change in the number of daily confirmed case and daily death cases resulting from COVID-19. In addition, two other dummy variables, $DPRSTI_t$ and $DPRCTI_t$, also were used to proxy the change in the strictness of government responses to the pandemic.

The regression analysis and the Wald test for the equality of γ_3 and γ_4 were performed using the daily dataset of the COVID-19 period. The regression results with robust standard errors, as well as the Wald statistics of the mentioned test, are presented in **Table 3**.

Table 3: The role of pandemic-related factors and government policy strictness

Panel A: Model estimations						
	α	γ_1	γ_2	γ_3	γ_4	R^2
D_{DNC}	0.0163***	0.5679***	0.4821***	**-6.9563*****	**-2.8999****	0.5044
	(0.0002)	(0.0546)	(0.0458)	(1.8399)	(1.3686)	
D_{DND}	0.0163***	0.4027***	0.5301***	1.0241	**-4.9484*****	0.5013
	(0.0002)	(0.0898)	(0.0548)	(4.8582)	(1.8994)	
D_{STI}	0.0163***	0.7456***	0.5112***	**-12.5480*****	**-4.3116****	0.5038
	(0.0002)	(0.1272)	(0.0568)	(4.1822)	(2.0278)	
D_{CTI}	0.0162***	0.7331***	0.5110***	**-12.1856*****	**-4.2948****	0.5072
	(0.0002)	(0.1236)	(0.0569)	(4.1056)	(2.0321)	
Panel B: Wald test for equality of coefficients, null hypothesis: $\gamma_3 = \gamma_4$						
	γ_3		γ_4		$\gamma_3 - \gamma_4$	
D_{DNC}	-6.9563***		-2.8999**		-4.0564	
D_{DND}	1.0241		-4.9484***		5.9725	
D_{STI}	-12.5480***		-4.3116**		-8.2364	
D_{CTI}	-12.1856***		-4.2948**		-7.8908	

This table reports the estimations for Eq. (4) with different dummy variables using the daily dataset

covering the COVID-19 period (Panel A). The Wald statistics corresponding to the Wald test for the null hypothesis $\gamma_3 = \gamma_4$ of each estimation is also reported (Panel B). Robust standard errors are reported in parentheses; ***, **, * denote significance at 1%, 5% and 10% level, respectively.

Source: Author's work.

First, it is clear that the estimated values of α, γ_1, and γ_2 in each model reported in Panel A are positive and statistically significant at the 1% level. This, again, implies that the capital asset pricing model would be satisfied if herding was not present during those analyzed periods.

What should be paid more attention to in those models, however, are the estimators for γ_3 and γ_4 as they help to find out whether herding did exist conditionally in several states of the examined factors. In addition, the Wald statistics of the test for the equality between those estimators in each model are also of concern since they show whether the extent to which investors herded is the same between those compared states.

Regarding the models related to the severity of the pandemic, both estimators of γ_3 and γ_4 in the model with D_{DNC} as the dummy variable are negative and statistically significant ($\gamma_3 = -6.9563$ at 1% level and $\gamma_4 = -2.8999$ at 5% level, respectively). On the other hand, only the estimated value of γ_4 in the model with D_{DND} as the dummy variable is negative and statistically significant, while that of γ_3 is, surprisingly, positive (equals to 1.0241) and not significant at 10% level. This result provides no evidence of herding during days after those in which the number of newly death cases rose compared to that of the previous one.

Considering models examining the effect of the strictness in government responses, the estimated values of γ_3 and γ_4 in the model with D_{STI} as the dummy variable are negative (equal to -12.5480 and -4.3116, respectively) and significant at the conventional level. The estimation of model with D_{CTI} as the dummy variable is pretty much the same, as both coefficients are negative while significant at 1% and 5% level, respectively.

The results of the Wald test reported in Panel B reject the null hypothesis about the equality of γ_3 and γ_4 in most of the modified models except the one with D_{DND} as the dummy variable. Since the differences between γ_3 and γ_4 in those three

scenarios are negative, these results imply that herding tends to be more prevalent during days when the investors fell that the pandemic became more severe (represented by an increase in the number of newly confirmed case in the previous day) and the measures implemented by the government tougher. In other words, the intensity of herding rose as the pandemic turned worse and the government responses became more stringent. The findings here are in contrast with those of Kizys et al. (2020), which concluded that government responses mitigated herding. However, as the study of Kizys et al. (2020) has some flaws in the methodology as discussed above, we would not use its findings as the basis for comparison.

The impact of the pandemic and government policies on the intensity of herding is justifiable. While the highly infectious and deadly nature of COVID-19 required governments to urgently take strong measures such as lockdowns and travel restrictions to mitigate its impact, it also was challenging to predict when the pandemic would emerge and persist, and, consequently, how long until containment measures could be removed. Lockdowns led to the sudden disruption in economic activities, and the uncertainty about their durability raised the level of uncertainty regarding both the macroeconomic environment and firms' profitability. Avery & Zemsky (1998) proved that investors tended to believe that others were better informed and therefore tried to follow the trend in earlier trades as they faced increasing uncertainty, and this case resulted from the pandemic should not be an exception.

In addition, the impact of increasing uncertainty resulting from COVID-19 on the intensity of herding may even be amplified due to a huge flow of new investors to the market during the pandemic, which, in turn, resulted from the pandemic itself. Since lockdowns resulted in the disruption in economic activities, many people experienced a substantial loss in their income. As a result, they turned to the stock market expecting to make gains in the short term. Vietnam Securities Depository statistics reported a sharp increase during the year of 2020

in the number of new domestic investors (Le, 2020), which also almost doubled at the end of 2021 compared to that in December 2019 (Vietnamnet Global, 2022). Many of these new investors, though, did not have either investment-making skills or much knowledge of the stock market, and thus when an extreme event occurred in it, they often based their decisions on those of others, thus triggering the herding phenomenon on the market.

CONCLUSION

In this study, the herd behavior of market participants in Vietnam has been studied in the context of the COVID-19 pandemic. Chang et al.'s (2000) model was used to explore herd behavior on two sets of daily and weekly trading data on the Ho Chi Minh City Stock Exchange, which range from January 2018 to December 2021. The results of regression analysis provide evidence about the presence of herd behavior during the global health crisis but not in the prior period. In addition, the estimations of the adjusted model confirm that the intensity of herding not only was raised by the spread of the COVID-19 pandemic but also by the increase in the strictness of government policies to mitigate it. Regarding policy implications, Vietnamese regulators should develop safety nets and circuit breakers that may help to stop or mitigate the impact of any potential crashes in the stock markets caused by events such as the COVID-19 pandemic. It also is necessary for new investors to acquire more knowledge about the market and skills for investing so they can confidently make decisions based on their own analysis instead of that of others.

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