The Connectedness between COVID-19 and Trading Value in Stock Market: Evidence from Thailand*

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Abstract

This study examines the connectedness between the number of COVID-19 cases in Thailand and trading value among investors in the Stock Exchange of Thailand. Daily data of COVID-19 cases and trading value were sourced from the Thailand ministry of public health and the Stock Exchange of Thailand, from January 12, 2020 to May 11, 2021. This study applies a multiple linear regression analysis to explain the relationship between variables. Empirical evidence clearly shows that the volatility of trading value was affected by COVID-19's new, confirmed, and deaths cases within the first pandemic period more than during the second pandemic period. Nevertheless, during the third pandemic period there is no evidence that the new, confirmed, and deaths cases significantly influenced trading value. Furthermore, the results show that COVID-19's new and deaths cases have a negative coefficient that indicated the trading value-buy/sell decreased in response to COVID-19's new and deaths cases, whereas the confirmed COVID-19 cases have a positive coefficient that indicated the trading value-buy/sell increased in response to COVID's confirmed cases. In summary, this study suggests that the number of COVID-19 cases have a significant impact on the trading value in the short term more than in the intermediate and long term.

Keywords: Stock Market, Trading Value, COVID-19, Thailand

JEL Classification Code: G01, G11, G12, G14

1. Introduction

The outbreak of the novel coronavirus, subsequently named COVID-19, first occurred in China in the end of December 2019. The virus expanded rapidly through human-to-human contact and infection spread without either individual knowledge, which implies that one patient can spread the disease to many people. Moreover, temperature has a significant impact on the spreading of the virus as well (Sharma, Tiwari, Jain, Yadav, & Erkut, 2021).

In early January 2020, infections expanded all over the world resulting in a public health emergency. Soon afterward, the World Health Organization (WHO) declared COVID-19 as public health emergency of international concern on January 30, 2020 and as a global pandemic on March 11, 2020.

Since the first COVID-19 infections emerged in Thailand early last year, the government declared a state of emergency on March 26, 2020 and announced a curfew on April 3, 2020 to control the number of COVID-19 cases, which led to an impact on economic development – in the second quarter of 2020 the real GDP growth rate fell at a rate of –6.1 percent and export value –17.8 percent (Thailand Office of the National Economic and Social Development Council, 2021); the number of unemployed persons increased to 750,000 (Bank of Thailand, 2021).

The first COVID-19 case in Thailand was confirmed on January 12, 2020 and shortly afterward the number of new cases rapidly rose from mid-March 2020. In the mean-time, infections around the world continued to increase, worsening the situation. The COVID-19 pandemic in Thailand was divided into three stages by the Thailand ministry of public health: the first stage spans from January 12, 2020

to December 15, 2020; the second stage from December 16, 2020 to April 9, 2021; and the third stage from April 10, 2021 till the time of writing (May 11, 2021). During the third stage, the number of new cases and deaths in Thailand increased significantly, as can be seen in Figure 1. On May 11, 2021, 1,919 COVID-19 new cases, 86,924 confirmed cases, 31 deaths, and accumulated deaths of 452 were recorded (Thailand Ministry of Public Health, 2021).

In order to prevent COVID-19 from spreading, the Thai government took many drastic measures, such as restriction on movement, controlling international travel, and closing bar/school/workplace. Those strict measures

tremendously impacted not only the service-based economy (Baker et al., 2020), but also financial markets (Amar, Belaid, Youssef, Chiao, & Guesmi, 2021) especially the greater volatility for stock markets (Fernandez, Gilbert, Indriawan, & Nguyen, 2021) – decrease in investor sentiment and stock price fluctuation (Guo, Li, & Li, 2021). As can be seen in Figure 2 with the movement of the Stock Exchange of Thailand (SET) index during the COVID-19 pandemic. It seems that in mid-March, most stock market investors reacted to the COVID-19 situation with fear and panic. Consequently, the SET index performance was dramatically volatile in March 2020, especially after the
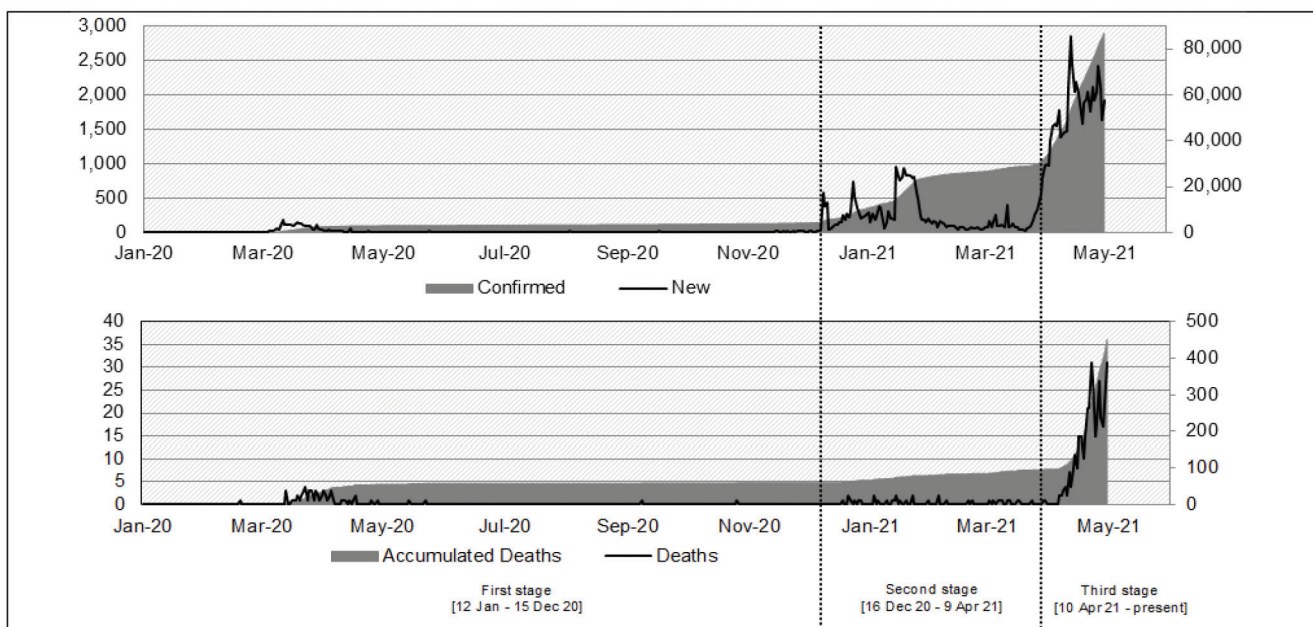

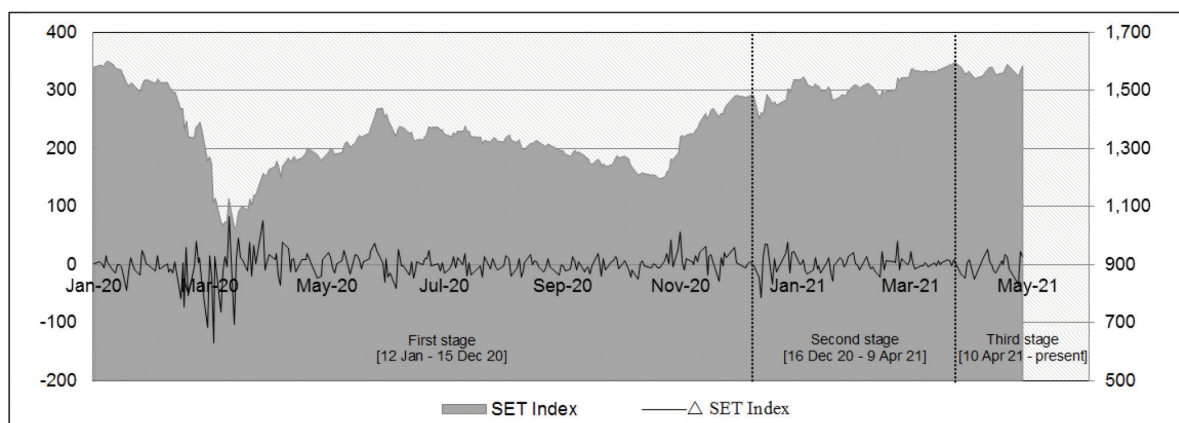**Figure 1:** COVID-19 Situation in Thailand (as of May 11, 2021)

Figure 2: SET Index During the COVID-19 Pandemic (as of May 11, 2021)

WHO announced the COVID-19 as a pandemic, and the SET index plunged by 134.98 points or 10.80 percent to 1,114.91 with a trading value of 101,652.04 million Baht on March 12, 2020 (Stock Exchange of Thailand, 2021a). Even though the number of COVID-19 cases in Thailand is not high compared to other countries, when the COVID-19 situation approached the next stage, investor behaviors changed due to more concern about risk; therefore, the stock market fluctuated more than usual. In theory, investors will reduce risk by selling stock to adjust their portfolio, or can say "the more stock you hold, the more risk you are taking on, and the more volatile your portfolio will be" (Investopedia, 2021).

In sum, nobody knows when the economy and stock market will recover from the COVID-19 crisis although some countries have begun vaccinating their citizens – Thailand has started since February 28, 2021; nevertheless, new infections and deaths increase sharply every day. To better understand the volatility in the stock market, this study mainly focuses on investigating the dynamic connectedness between the daily number of COVID-19 cases in Thailand and the volatility of trading value among investors in the Stock Exchange of Thailand. The rest of this study is structured as follows. Section 2 presents a brief theory and literature review on COVID-19 and the stock market. Section 3 illustrates the data and describes the research methodology. Section 4 outlines the empirical results, while the discussion is provided in Section 5. Section 6 presents the conclusion of the study.

2. Theory and Literature Review

2.1. Psychology of Investing

Intellectually, every investor knows that they need to buy low and sell high in order to make a profit, but during times of market swings because of the crisis such as the COVID-19 pandemic nobody knows where is the bottom. Therefore, investor's behavior might change. In sum, the psychology of investing tries to explain how psychology can affect investment behavior (Nofsinger, 2018) Normally, investment decisions are complicated and depend on individual characteristics and market conditions (Lopez, Perez, Pineiro, & Sevic, 2021), however, decision-making might be irrational – controlled by emotion – due to bias and errors in thinking (Pring, 1992) that lead to different investment sentiments (Sun, Bao, & Lu, 2021). Actually, the reasons why investors do not make successful investments are: 1) investors do not know how to use information properly and make forecasting errors (Bodie, Kane, & Marcus, 2007); 2) investors make decisions before they get information; and 3) investors are overconfident (Olivers Learning, 2021).

2.2. Efficient Market Hypothesis

The efficient market hypothesis, otherwise known as the random walk hypothesis, is based on the assumption that stock price responds immediately to all information (Bodie et al, 2007), such as trading volume, Brent oil price (Donnell, Shannon, & Sheehan, 2021), interest rate, economic conditions, and the particular risk inherent in the stock (Spiro, 1996). Similarly, investor behavior and reaction are affected by market news (Mensi, Shafiullah, Vo, & Kang, 2021). For example, during the COVID-19 pandemic investors search for the news about the pandemic, which lead to the volatility of stock prices (Smales, 2021). In theory, the efficient market hypothesis could be divided into three different forms including: 1) weak form efficiency – stock price reflects market information such as historical price; 2) semi-strong form efficiency – stock price reflects all publicly available information; and 3) strong form efficiency – stock price reflects all information relevant to a stock both of insider and publicly information (Ross, Westerfield, Jaffe, & Jordan, 2007).

2.3. Stock Exchange of Thailand

The Stock Exchange of Thailand, usually referred to as SET is the marketplace or center for purchasing common and preferred stocks among investors, and officially started trading on April 30, 1975 (Stock Exchange of Thailand, 2021b). The indicators that measure the performance of the stock market are called the SET index, which is the major stock market index in Thailand. In general, the daily trading value of investors is essential to changes of the SET index. The SET divides investors into four groups including: local institutes, proprietary traders, foreign investors, and local investors. Nowadays, the Thailand stock market has experienced a significant negative impact due to the outbreak of COVID-19 (Kamaludin, Sundarasen, & Ibrahim, 2021) as well as many countries worldwide.

2.4. Literature on COVID-19 and Stock Market

Since COVID-19 was declared a global pandemic by the WHO, investors around the world feared this crisis would lead to an adjustment of portfolios (Nguyen, Phan, Ming, & Nguyen, 2021; Hanif, Mensi, & Vo, 2021). Not only the COVID-19 pandemic, but in the past the global stock markets has also plummeted several times because of disease outbreaks: SARs in 2003, MERs in 2012, Ebola in 2014 (Szczygielski, Bwanya, Charteris, & Brzeszczynski, 2021); and by the financial crises: subprime crisis in 2007, European crisis in 2009. However, to contain the spread of COVID-19, the governments in many countries took strict measures that have had a negative impact on real economic

systems (Szczygielski et al., 2021) – decline in consumer demand (Nguyen et al., 2021), increase in unemployment rate, and household debt.

Currently, many researchers are trying to explain how COVID-19 affected financial markets, but for this study the researcher mainly reviews the literature on the stock market. Several studies found evidence that stock market volatility was caused by the outbreak of COVID-19. Fernandez et al. (2021); Nguyen et al. (2021); Rahman, Amin, and Mamun (2021); Corbet, Hou, Hu, Oxley, and Xu (2021) found the pandemic had significant negative on the stock market in the short term more than both the intermediate and long term (Mensi et al., 2021), particularly the number of new confirmed COVID-19 cases (Amar et al., 2021). Similarly, Fernandez et al. (2021); Seven and Yilmaz (2021) found evidence that the stock index performance worldwide has declined by more than 30 percent, which lead to a temporary halt in trading on stock in many countries (Zhang & Hamori, 2021) especially between the end of February to the end of April 2020 (Contessi & Pace, 2021). In addition, the US and Europe stock markets seemed to respond to the COVID-19 pandemic more than Asian stock markets (Szczygielski et al., 2021). However, the lessons of the impact of COVID-19 can be transferred from one market to another (Topcu & Gulal, 2020). Not only the stock market performance is affected by the COVID-19 pandemic, but also the stock indices (Khan et al., 2020; Guo, Zhao, Yu, & Zhang, 2021; Donnell et al., 2021).

Based on the literature reviews, most researchers have tried to explain how the COVID-19 pandemic affected the stock markets by using different approaches, but no one explains by using the trading value, therefore this study attempts to explore the connectedness among the trading value and the COVID-19 pandemic.

3. Data and Methodology

3.1. Data

This study uses time-series data that spans the date range of January 12, 2020 through May 11, 2021. More precisely, the researcher divides observations into three sub-samples according to the COVID-19 situation in Thailand: (1) the first stage starts from January 12, 2020 to December 15, 2020; (2) the second stage starts from December 16, 2020 to April 9, 2021; and (3) the third stage starts from April 10, 2021 to May 11, 2021. Variables included in this study are the daily number of COVID-19 cases and trading value, as collected from Internet sources.

3.1.1. COVID-19 Cases

The daily data of COVID-19 cases, including new cases, confirmed cases, and deaths, are obtained from the Thailand

ministry of public health (https://www.moph.go.th). The data runs from the day that Thailand found the first COVID-19 case on January 12, 2020.

3.1.2. Trading Value

This study used the daily dataset (five trading day: Monday to Friday) of trading value by investor type, which is divided into four groups: (1) local institutes, (2) proprietary traders, (3) foreign investors, and (4) local investors. The data is retrieved from the Stock Exchange of Thailand (https://www.set.or.th).

3.2. Methodology

According to the objective of this study, the researcher explores how the trading value of investors in the Stock Exchange of Thailand responded to the COVID-19 pandemic (daily number of new, confirmed, and deaths COVID-19 cases). This study utilizes a multiple linear regression analysis to explain the relationship between independent variables – daily number of COVID-19 cases, and dependent variable – trading value. The regression model is constructed as following:

$$TV_t = \alpha_0 + \beta_1(N) + \beta_2(C) + \beta_3(D) + \varepsilon_t \tag{1}$$

where TV_t is the trading value by investor types including local institutes-buy/sell (SB/SS), proprietary traders-buy/sell (PB/PS), foreign investors-buy/sell (FB/FS), and local investors-buy/sell (LB/LS), α_0 is the constant term, β_1, β_2, and β_3 are the slop coefficient, N is the daily number of COVID-19 new cases, C is the daily number of COVID-19 confirmed cases, D is the daily number of COVID-19 deaths cases, and ε_t is the error term.

4. Empirical Results

4.1. Descriptive Statistics

Over the sample period, which spans from January 12, 2020 to May 11, 2021, the average number of the COVID-19 cases including new, confirmed, and deaths are 179.22, 10,212.02, and 0.93, respectively. The maximum of the new cases is 2839, confirmed cases 86,924, and deaths cases 31. In terms of skewness and kurtosis, the new, confirmed, and deaths cases are positively skewed and have positive kurtosis value.

The average trading value by investor types includes local institutes (buy/sell), proprietary traders (buy/sell), foreign investors (buy/sell), and local investors (buy/sell) are 6,757.62/6,796.23, 7,873.91/7,827.31, 26,316.13/27,287.78, and 33,259.43/32,295.77, respectively. Besides, the average

trading value would imply that during the COVID-19 pandemic most investors sold more than they bought, except for the proprietary traders and local investors. There is positive skewness for all investor types; similarly, the kurtosis is positive for every type of investor except for the local investors-buy. The results of descriptive statistics are shown in Table 1.

4.2. Correlations Matrix

Table 2 presents the result of correlations matrix. The dependent and independent variables used in this study have no multicollinearity problem (coefficient is lower than 0.80), implying that every variable is suitable for regression analysis.

4.3. Multiple Regression Analysis

In this part, the researcher intended to understand the connectedness between the daily number of COVID-19 cases and trading value in the Stock Exchange of Thailand during the COVID-19 pandemic. This study divides the observation into three different periods: first period from January 12, 2020 to December 15, 2020; second period from December 16, 2020 to April 9, 2021; and third period from April 10, 2020 to May 11, 2021. Results of the regression analysis are shown in Table 3.

During the first pandemic period, the daily number of COVID-19 cases – new, confirmed, deaths – has a significant impact on the trading value of all investor types except for

Table 1: Descriptive Statistics (Full Sample from January 12, 2020 to May 11, 2021)

Variables		Mean	Minimum	Maximum	Std. Dev.	Skewness	Kurtosis
COVID-19 cases	New	179.22	0	2839	458.565	3.372	11.047
	Confirmed	10212.02	1	86924	15654.712	2.581	7.222
	Deaths	0.93	0	31	3.755	5.643	34.000
Trading value (Million baht)	Local institutes-buy	6757.62	2029.49	23331.87	2574.259	1.525	5.683
	Local institutes-sell	6796.23	2516.73	20851.36	2333.401	1.722	6.856
	Proprietary traders-buy	7873.91	3104.31	21423.10	2464.602	0.932	2.262
	Proprietary traders-sell	7827.31	3500.91	22457.80	2485.015	1.105	3.228
	Foreign investors-buy	26316.13	13156.37	72648.88	8936.238	1.213	2.898
	Foreign investors-sell	27287.78	12305.09	70956.63	8490.197	1.095	2.530
	Local investors-buy	33259.43	15076.19	70380.92	11802.449	0.679	–0.149
	Local investors-sell	32295.77	13427.71	78168.06	12214.566	0.730	0.167

Table 2: Correlations Matrix (Full Sample from January 12, 2020 to May 11, 2021)

Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1	Local Institutes-buy	1										
2	Local Institutes-sell	0.46*	1									
3	Proprietary Traders-buy	0.39*	0.54*	1								
4	Proprietary Traders-sell	0.37*	0.55*	0.74*	1							
5	Foreign Investors-buy	0.46*	0.62*	0.76*	0.74*	1						
6	Foreign Investors-sell	0.45*	0.56*	0.70*	0.69*	0.76*	1					
7	Local Investors-buy	0.34*	0.54*	0.64*	0.65*	0.72*	0.72*	1				
8	Local Investors-sell	0.48*	0.49*	0.67*	0.65*	0.74*	0.69*	0.76*	1			
9	New	0.01	–0.12**	–0.27*	–0.28*	–0.17*	–0.14**	–0.03	–0.03	1		
10	Confirmed	–0.26*	–0.11	0.33*	0.31*	0.23*	0.16*	0.35*	0.37*	0.75*	1	
11	Deaths	–0.28*	–0.12**	0.31*	0.29*	0.19*	0.12**	0.28*	0.30*	0.73*	0.77*	1

Note: * and ** Correlation is significant at the 0.1 and 0.05 levels, respectively.

Table 3: Multiple Regression Analysis

Variables		COVID-19					
		First stage		**Second stage**		**Third stage**	
		B	Sig.	*B*	Sig.	*B*	Sig.
Local Institutes-buy (SB)	Constant	8181.459	0.000	38380.006	0.000	8644.097	0.035
	New cases (N)	−30.034**	0.010	0.981	0.311	−0.828	0.524
	Confirmed cases (C)	3.153**	0.028	0.562**	0.002	0.186	0.196
	Deaths cases (D)	−212.134**	0.007	−557.698**	0.001	−86.891	0.199
	R^2	0.149		0.155		0.153	
	SB = 8181.46 − 30.03(N) + 3.15(C) − 212.13(D)			SB = 38380.01 + 0.56(C) − 557.70(D)			
Local Institutes-sell (SS)	Constant	7653.867	0.000	24711.242	0.002	8209.225	0.023
	New cases (N)	−35.457**	0.001	1.493***	0.078	1.178	0.304
	Confirmed cases (C)	3.077**	0.020	0.235	0.133	−0.077	0.524
	Deaths cases (D)	−195.569**	0.007	−293.364**	0.042	−0.862	0.988
	R^2	0.108		0.176		0.081	
	SS = 7653.87 - 35.46(N) + 3.08(C) − 195.57(D)			SS = 24711.24 + 1.49(N) − 293.36(D)			
Proprietary Traders-buy (PB)	Constant	7099.378	0.000	38492.792	0.000	7717.289	0.030
	New cases (N)	−50.010*	0.000	0.466	0.633	−0.386	0.730
	Confirmed cases (C)	4.648*	0.000	0.485**	0.009	−0.059	0.627
	Deaths cases (D)	−249.888*	0.000	−500.482**	0.003	40.774	0.476
	R^2	0.141		0.151		0.066	
	PB = 7099.38 − 50.01(N) + 4.65(C) − 249.89(D)			PB = 38492.79 + 0.49(C) − 500.48(D)			
Proprietary Traders-sell (PS)	Constant	7186.483	0.000	41340.194	0.000	4314.209	0.271
	New cases (N)	−50.844*	0.000	1.042	0.320	−2.107	0.129
	Confirmed cases (C)	4.529*	0.000	0.544**	0.006	0.061	0.667
	Deaths cases (D)	−247.138*	0.000	−554.791**	0.002	50.585	0.456
	R^2	0.149		0.147		0.194	
	PS = 7186.48 − 50.84(N) + 4.53(C) − 247.14(D)			PS = 41340.19 + 0.54(C) − 554.79(D)			
Foreign Investors-buy (FB)	Constant	24630.078	0.000	64400.863	0.020	13926.352	0.284
	New cases (N)	−178.255*	0.000	7.412**	0.012	−2.190	0.620
	Confirmed cases (C)	19.852*	0.000	0.506	0.347	0.199	0.675
	Deaths cases (D)	−1104.641*	0.000	−578.625	0.243	129.898	0.562
	R^2	0.094		0.103		0.210	
	FB = 24630.08 − 178.26(N) + 19.85(C) − 1104.64(D)			FB = 64400.86 + 7.41(N)			

Table 3: Continued

Variables		COVID-19					
		First stage		Second stage		Third stage	
		B	Sig.	*B*	Sig.	*B*	Sig.
Foreign Investors-sell (FS)	Constant	26765.085	0.000	54035.004	0.066	9542.383	0.612
	New cases (N)	−153.870*	0.000	7.725**	0.015	−3.778	0.563
	Confirmed cases (C)	17.047*	0.000	0.289	0.616	0.273	0.696
	Deaths cases (D)	−979.657*	0.000	−384.221	0.468	173.475	0.599
	R^2	0.094		0.100		0.153	
	FS = 26765.09 − 153.87(N) + 17.05(C) − 979.66(D)			FS = 54035.00 + 7.73(N)			
Local Investors-buy (LB)	Constant	27422.051	0.000	116218.118	0.003	32734.316	0.084
	New cases (N)	−46.447	0.265	5.190	0.206	5.681	0.365
	Confirmed cases (C)	11.370**	0.028	0.981	0.196	0.379	0.571
	Deaths cases (D)	−612.978**	0.031	−1223.591***	0.080	−98.887	0.752
	R^2	0.034		0.131		0.406	
	LB = 27422.05 + 11.37(C) − 612.98(D)			LB = 116218.12 − 1223.59(D)			
Local Investors-sell (LS)	Constant	25727.528	0.000	137405.350	0.001	40956.229	0.008
	New cases (N)	−64.575	0.154	3.789	0.356	6.983	0.146
	Confirmed cases (C)	14.370**	0.011	1.465***	0.056	0.447	0.374
	Deaths cases (D)	−757.277**	0.014	−1628.021**	0.021	−238.305	0.317
	R^2	0.044		0.129		0.530	
	LS = 25727.53 + 14.37(C) − 757.28(D)			LS = 137405.35 + 1.47(C) − 1628.02(D)			

Note: *, **, and *** significant at the 0.1, 0.05, and 0.01 levels, respectively.

the local investors for which the volatility of trading value correlated with only the confirmed and deaths cases. The results also show evidence of a negative coefficient for the new and deaths COVID-19 cases, whereas the confirmed COVID-19 cases have a positive coefficient.

During the second pandemic period, the daily number of new COVID-19 cases has a significant impact on the trading value of local institutes-sell, foreign investors-buy and sell, with a positive coefficient. The daily number of confirmed COVID-19 cases has a significant impact on the local institutes-buy, proprietary traders-buy and sell, and local investors-sell, with a positive coefficient. The daily number of deaths has a significant impact on the local institutes-buy and sell, proprietary traders-buy and sell, and local investors-buy and sell, with a negative coefficient.

During the third pandemic period, there is no evidence that the daily number of COVID-19 cases – new, confirmed, and deaths – impacted the trading value of all investor types.

In summary, it is clear that the volatility of trading value of all investor types was affected by the COVID-19 new, confirmed, and deaths cases during the first pandemic period. However, during the second pandemic period, trading value was affected to some extent by COVID-19 cases. On the contrary, no evidence of COVID-19 new, confirmed, deaths cases impacted the trading value at all during the third pandemic period. Those results imply that the daily number of COVID-19 cases had a significant impact on the trading value in short-term more than intermediate-and-long-terms.

5. Discussion

From the results, this study found the daily number of COVID-19 new, confirmed, and deaths cases have a significant impact on the trading value of investors during the first pandemic period compared with the second and third pandemic periods. These results support Mensi et al. (2021) who found a significant increase in volatility among stock

markets within the short term more than in the inter-mediate and long term. Kamaludin et al. (2021) found the pandemic has had a significant negative impact on the Thailand stock market; also Contessi and Pace (2021) found extreme decline in the stock index performance between the end of February and the end of April, 2020. Obviously, the daily number of COVID-19 new and deaths cases have had a significant and negative impact on the trading value of investors. These results are similar to previous studies; Fernandez et al. (2021); Nguyen et al. (2021); Rahman et al. (2021); Corbet et al. (2021) found the pandemic has had significant negative impact on stock markets. Fernandez et al. (2021); Seven and Yilmaz (2021) found a negative stock index performance reaction to the pandemic; Khan et al. (2020); Guo et al. (2021); Donnell et al. (2021) found the pandemic negatively associated with changes in stock indices.

Furthermore, these results support the findings by Mensi et al. (2021) who claim that investor behavior is affected by market news, confirmed by Smales (2021), who found that the volatility of stock price is affected by searching for the news among investors.

6. Conclusion

This study analyzed the connectedness between the daily number of COVID-19 cases and the trading value among investors in Thailand by employing a multiple linear regression analysis. First, the results show that COVID-19 cases – new, confirmed, deaths – have had a significant impact on the trading value of investors within the first pandemic period as compared with the second and third pandemic periods. However, it is interesting that there is no evidence of connectedness between the COVID-19 cases and trading value during the third pandemic period, implying that investors experienced a short-term panic about the COVID-19 pandemic that lead to the volatility of trading value, but in the long term investors either become less panicked or there is another variable affecting the trading value among investors. Second, there is evidence of connectedness between variables; the COVID's new and deaths cases have a negative coefficient, implying the trading value-buy/sell decreased in response to the COVID-19 new and deaths cases; and the COVID-19 confirmed cases have a positive coefficient, implying the trading value-buy/sell increased in response to the COVID confirmed cases.

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