HOW COVID19 AFFECTS THE STOCK RETURN OF THE VIETNAMESE PHARMACEUTICAL INDUSTRY: EVENT STUDY METHOD

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Abstract. The outbreak of Covid-19 had a negative impact on socio-economic activities and stock markets of many countries around the world. However, it could affect the pharmaceutical industry in a different way. The purpose of this article is to examine how the covid19 pandemic affects the share price of the pharmaceutical industry in Vietnam. Event study is the main methodology of this article. The three events selected for study include: (i) On January 23, 2020, the first two patients, Chinese nationality, were found infected with covid19; (ii) March 6, 2020: The 17th patient, an international student from the UK, started the wave of covid19 infection in the community in Vietnam; (iii) On March 30, 2020, Vietnam announced the nationwide outbreak of Covid-19 and implemented economic lockdown. The article found that the impact of the three events on pharmaceutical stock prices was sign inconsistency. Cumulative abnormal returns (CAR) is positive after the first and third event is declared but the CAR is negative after the second event is announced. Of the three events, the stock price response to the third was the slowest since CAR (0; 7) started to be statistically significant while the other two events CAR (0; 2) were statistically significant. The results from this study have added to further insights into the effects of disease on the response of pharmaceutical stock prices.

Keywords: abnormal return; lockdown; pharmaceutical industry; stock market

1. Introduction

By the end of 2019, Vietnam's population size was 96.2 million, ranked third in Southeast Asia (after Indonesia and the Philippines) and ranked 15th in the world (GSO 2020). However, the value of healthcare and pharmaceutical spending per capita in Vietnam is 149 USD (in 2018) and 85 USD (2020), respectively, is

considered low compared to other countries in ASEAN. In 2018, on average, each Vietnamese spent $ 149 on health care, lower than Malaysia's $ 453, the Philippines $ 157, Thailand $ 271 and Singapore $ 3,244 (KPMG 2020). With a population of over 96 million people, but the value of spending on the health care and pharmaceutical industries in Vietnam is still quite low suggesting that this industry still has growth potential.

The Covid-19 pandemic had a negative impact on many stock markets around the world (Singh, Dhall, Narang, Rawat 2020). However, research results from scholars show that countries with the largest pharmaceutical industries in the world such as China, India (Mckinsey & Company 2020) or in developed countries like Australia, pharmaceutical stock prices in these countries all responded positively to news about the outbreak of Covid-19 Covid-19 (Al-Awadhi, Alsaifi, Al-Awadhi, Alhammadi 2020; Alam, Wei, Wahid 2020; He, Sun, Zhang, Li 2020; Mittal, Sharma 2021). How will Covid-19 affect the share prices of the pharmaceutical industry in developing countries with the pharmaceutical industry in average. Serious discussions are needed on this topic. These reasons motivate the author to study the effect of Covid-19 on the share price of the pharmaceutical industry in Vietnam.

In Vietnam, the first patient death related to Covid-19 recorded on 31/7/2020 (MOH 2020a) is quite long compared with the time when the first patient was found to be positive for this virus. Therefore, this paper examines three events related to the evolution of the Covid-19 epidemic in Vietnam, including: On January 23, 2020, the first patient positive for Covid-19 was found to be a foreigner; on March 6, 2020, it was discovered that the patient was an international student returning from England and then discovered many patients infected with the virus in the community; March 30, 2020 Vietnam announced Covid 19 outbreak in the country and then lockeddown the economy.

Research shows that pharmaceutical stock prices both respond positively to the first and third events when the cumulative abnormal returns are greater than zero after the event was announced. In contrast, the second event has a negative impact on stock prices when the cumulative abnormal return CAR (0; 2) to CAR (0; 9) is both negative and statistically significant. Inconsistency in the direction of events (positive, negative) on pharmaceutical stock prices is the finding of this study compared to the studies of Al-Awadhi et al. (2020), Alam et al. (2020), He et al. (2020), Mittal, Sharma (2021). This is also the main contribution of this study. In addition, CAR (0; 7) was statistically significant in the third event while CAR (0; 2) was statistically significant in the other two events. It shows that the stock price reacts most slowly to the third event. This study adds to the empirical evidence and new insights into the impact of the epidemic on pharmaceutical stock prices in developing countries with the pharmaceutical industry still in average.

2. Literature review

In the capital market, emergency events often affect investor sentiment and behavior in the stock market and are reflected in stock prices. The literature suggests that these events may not have the nature of common financial factors such as terrorism (Nikkinen, Omran, Sahlstr 2008; Masood, Javaria, Petrenko, 2020), weather (Phuong, 2019; Lanfear, Lioui, Siebert 2019), epidemic (Goh, Law 2002; Chen, Jang, Kim 2007; Mctier, Ts, Wald 2011; Li 2018). It can also be the potential events leading to policy changes in financial markets such as financial crisis (Al Rjoub, Azzam 2012; Schwert 2011), debt crisis in Europe (Righi, Ceretta 2011). In general, the results from these studies show that the market's response to these emergencies is often negative to most industries in the stock market, the number of beneficiaries is usually in the minority.

The pharmaceutical and healthcare industry is believed to be one of the few industries on the stock market to benefit from disease crises. The outbreak of SARS in 2003 in Taiwan had a negative impact on travel, wholesale and retail stocks, on the contrary, biotechnology industry stocks have seen positive gains from the event (Chen, Chen, Tang, Huang 2009). Chen et al. (2009) argued that due to the dramatic increase in demand for medical and

healthcare devices, these products are the output of the biotechnology industry, so the share price of they increase rapidly. This industry's positive response in Taiwan continues to repeat during outbreaks of infectious diseases such as dengue fever, SARS and H1N1 (Wang, Yang, Chen 2013).

Besides, the share price of the pharmaceutical industry also reacted differently based on the way of communication and disclosure of pandemic information to the public. Research by Jingwen (2005) in China shows that pharmaceutical stock prices have a significant positive reaction if information about the SARS epidemic is well disclosed. On the contrary, if the published information on the SARS epidemic is not prominent, the market reaction of listed pharmaceutical companies is negligible. Jingwen (2005) believes that this is an expression of the salience effects of Chinese investors.

Studies related to the Covid-19 outbreak in Australia, China, and India all showed the general trend that the healthcare and pharmaceutical industry's share prices responded positively to the pandemic news. In China, the pharmaceutical industry has outperformed the market (Al-Awadhi et al. 2020), the healthcare industry reacts negatively at the event day but the response was positive the following days (He et al. 2020). He et al. (2020) argue that this reversal is the Covid-19 epidemic that has encouraged companies to respond quickly by promoting the export of masks, ventilators and other medical devices.

Slightly different from the stock market in China, Alam et al. (2020) showed impressive positive returns on stock prices of the healthcare and pharmaceutical industries from the date the Australian Government issued the announcement of the Covid-19 outbreak and this positive trend is maintained until 9 days later.

Research on the Indian stock market, Mittal, Sharma (2021) analyzed with many different timeframes, the results show that the BSE-Healthcare index is the only industry that brings positive returns while the remaining branches are negative. BSE-Healthcare increased by 14.19% within 1 month (March 2020 to April 2020) from the date of the Covid-19 outbreak in India while the SENSEX benchmark index fell 12% during this period. If the period from February 1, 2020 to April 24, 2020, BSE-Healthcare increased by 18% while the standard SENSEX index decreased by 47.69% (Mittal, Sharma 2021).

The impact of Covid-19 on the Vietnamese pharmaceutical industry

Vietnam's pharmaceutical industry has a shortage of imported raw materials because Covid-19 has disrupted the supply chain. Annually, Vietnam Pharmaceutical industry must import 80-90% of raw materials as Active Pharmaceutical Ingredients. In which, China and India are the two largest sources of pharmaceutical raw materials in the world (Mckinsey & Company 2020) as well as Vietnam. In 2019, the proportion of pharmaceutical raw materials imported from China and India accounted for 63.7% and 16.7%, respectively, in 2019 (FPTS 2020). According to the General Department of Vietnam Customs*, in the first 2 months of 2020, due to the affected supply in the importing markets, the total value of import turnover of pharmaceutical raw materials of Vietnam decreased by 30.8% over the same period, reached 46.5 million USD. In which, the value of import turnover from China, India and the rest of the world is 27.2 million USD (-30.0% YoY), 9.4 million USD (-25.8% YoY), and 9.9 million USD (-24.3% YoY).

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[*] https://www.customs.gov.vn/Lists/EnglishStatistics/Default.aspx?language=en-US
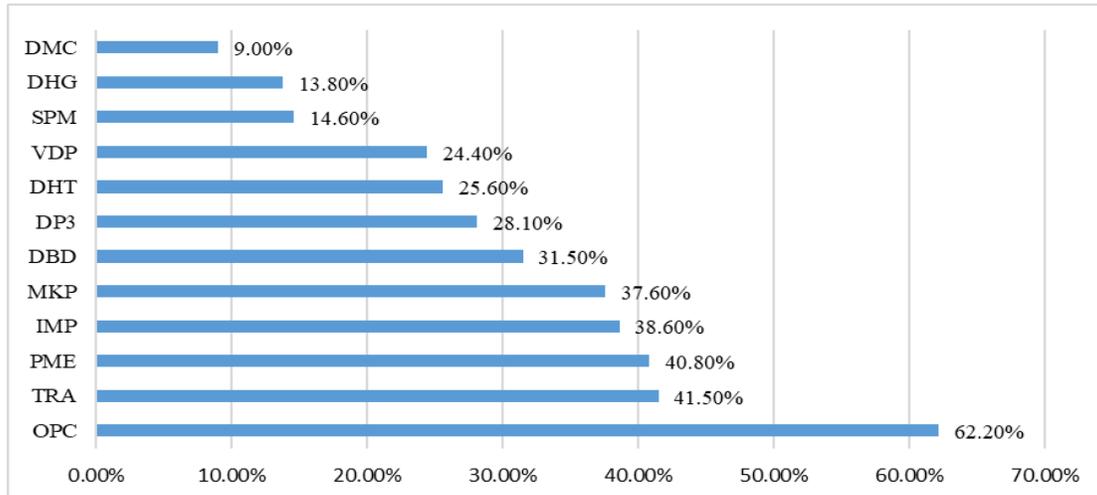
Figure 1. Percentage of material inventory value compared to the demand for raw materials of some pharmaceutical companies
Source: Financial statements of enterprises as at 31 December 2019 and FPTS (2020)

In Vietnam, after adjusting the value of inventories that are about to expire in 2020, of the listed companies, only 6 listed companies have an inventory ratio compared to the demand for more than 30%, including: OPC (62.2%), TRA (41.5%), PME (40.8%), IMP (38.6%), MKP (37.6), DBD (31.5%) (Figure 1). Therefore, the epidemic will make it difficult for the remaining pharmaceutical enterprises to import raw materials from China, India and other markets.

When the Covid-19 epidemic broke out, due to the psychology of storing and protecting health, the revenue of pharmacies and drugstores in Vietnam increased 164-168% in the first two months of 2020 compared to the same period in 2019. However, most of this profit belongs to foreign companies, and domestic pharmaceutical companies benefit very little from this growth. As the demand for preventive products has increased with a strong focus on masks, hand sanitizers and vitamins are not the main business items of listed pharmaceutical companies in Vietnam. These businesses mainly benefit from popular medicines such as pain relievers, antipyretics, cough medicines, eye-nose drops and sold through OTC channels. In which, DHG is the listed pharmaceutical company with the largest OTC market share of 7.8% for these products (FPTS 2020).

3. Research objectives and research questions

Research objectives: Up to now, researches on the impact of covid19 on pharmaceutical stock prices have mainly focused on countries leading in market share of the pharmaceutical industry in the world (Mckinsey & Company 2020) such as China (Al-Awadhi et al. 2020) and India (Mittal, Sharma 2021), or focus on developed countries such as Australia (Alam et al. 2020). However, the impact of covid19 on the industry's stock price in developing countries with an underdeveloped pharmaceutical industry has not been mentioned. Therefore, this article will fill this gap by studying the impact of covid19 on the share price of Vietnam's pharmaceutical industry in 2020.

Research questions: Overall study of Al-Awadhi et al. (2020); Alam et al. (2020); Mittal, Sharma (2021) are all using the event study method in the Australian, Chinese, and Indian stock markets. Therefore, this article also uses event study method to answer the questions:
- How does Covid-19 affect the share price of the Vietnamese pharmaceutical industry.
- What are the similarities and differences from the results of this study compared to the studies of (Al-Awadhi et al. 2020; Alam et al. 2020; Mittal, Sharma, 2021).

4. Methodology

This article uses an event research method to examine the effect of Covid-19 on the stock price response of Vietnam's pharmaceutical industry in 2020. The basis for selecting the event date, event window, estimate window and research model will be explained in this section.

Select the event date and event window: In Vietnam, the first patient infected with Covid-19 detected at the end of January 2020 was quite early, but more than 6 months later, on July 31, 2020, the first patient's death related to Covid-19 (MOH 2020a) is much better with world disease progression. Therefore, unlike Mittal, Sharma (2021) which uses the first reporting date of Covid-19 death in India as the event date, this study uses two event days including: time of identification of the first patient infected with Covid-19 virus and the timing of the discovery of patients that have the spread of disease in the community are the event dates. In addition, similar studies in China stock market (Al-Awadhi et al. 2020; He et al. 2020), India (Mittal, Sharma 2021), Australia (Alam et al. 2020) and Vietnam (Phuong 2021) have chosen the time of the outbreak of Covid-19 in the countries to be the event date, this article also selects the date when Vietnam announced the outbreak of Covid-19 as the date of the event. To avoid overlap between event windows, the paper used 9 trading days - before and after each event and at least 3 weeks between two consecutive events. In summary, there are three facts used to study the effect of Covid-19 on the share price of the pharmaceutical industry in Vietnam. The first event on 23 January 2020 Vietnam recorded the first patient infected with Covid-19 (Tuoitre 2020). The second event on March 6, 2020 marked the second wave of Covid-19 infection in the community in Vietnam (MOH 2020b). These are two events that happened before March 11, 2020, the day the WHO declared Covid-19 a pandemic. The third event to be studied was on March 30, 2020 when Vietnam declared a nationwide epidemic of Covid-19 (VGPnews 2020).

Select the estimated window: Similar to the Mittal & Sharma (2021) study of the pharmaceutical industry in the Indian stock market, this study also uses data one year prior to the event date to estimate. Therefore, the estimate window for each event is 250 trading days prior to each event.

Estimation model:
First, the daily return is calculated using the formula (1)
$$R_t = \ln (P_t/P_{t-1}) \tag{1}$$
This article uses Brenner's Market Model (1979) to calculate abnormal return. This is a popular method used in event study. It was used by He et al. (2020) to study the effect of Covid-19 on stock prices in the Chinese stock market.
The expected return on the rate of return is calculated using formula (2)
$$ER_{it} = \alpha_i + \beta_i R_{m,t} \tag{2}$$
Abnormal return is calculated by using the formula (3).
$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{m,t}) \tag{3}$$
Cumulatve abnormal returns is calculated using the formula (4)
$$CAR\ (t_1, t_2) = \sum_{t=t1}^{t2} AR_{it} \tag{4}$$
Where:
- P_t and P_{t-1} are closing prices of the pharmaceutical industry at day t and day (t-1); ln is the natural logarithm of P.
- $ER_{i,t}$ and $R_{m,t}$ are the daily expected return of the industry index and the return of the VNIndex at day t.
- α_i and β_i are regression coefficients of daily return between industry i and the market.
- AR_{it} is the abnormal return of industry i at day t, calculated as the difference between the actual return at equation (1) and the expected return in equation (2).
- $CAR(t_1, t_2)$ is the cumulative abnormal return of the pharmaceutical industry over the period from t1 to t2 for each event.

The t-statistic test is used to examine whether the movement of Covid-19 in Vietnam has an impact on the share price of the pharmaceutical industry. T-statistics are calculated at different timelines in each event window for easy comparison.

Research data: FiinPro (http://fiinpro.com/) uses daily capitalization weighting of all pharmaceutical companies listed on the Ho Chi Minh City Stock Exchange (HSX) and the Stock Exchange. Stock Exchange to calculate the Pharmaceutical Industry Index. This article uses the Pharmaceutical industry data compiled by FiinPro and the daily close of VNIndex on the HSX to examine the impact of Covid-19 on Vietnam's pharmaceutical stock price response in 2020.

5. Results and discussion
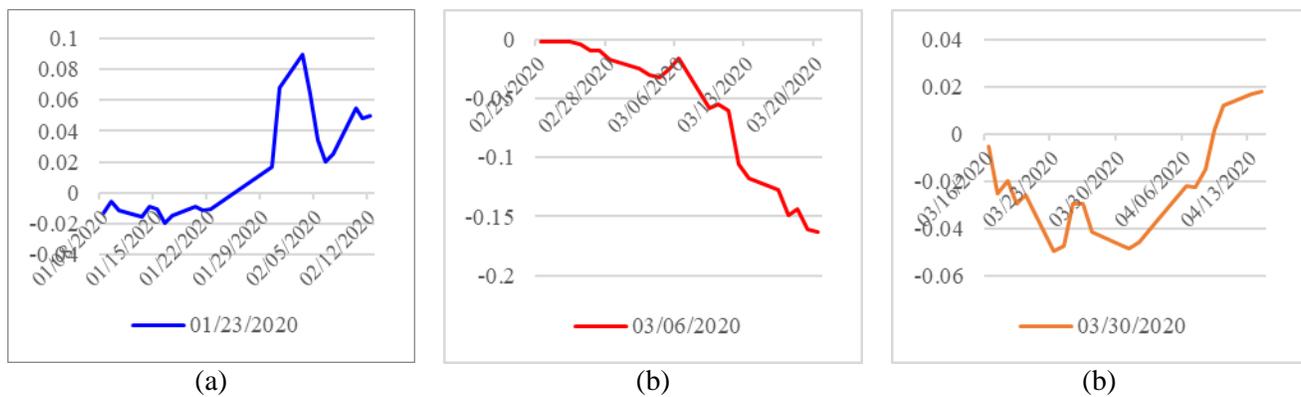
(a) (b) (b)
Figure 2. Pharmaceutical Industry Index's Cumulative Abnormal Return (CAR) around event dates

Figure 2a shows that the cumulative abnormal return CAR increased sharply after January 23, 2020 then plummeted but still greater than zero. It shows that the pharmaceutical industry's stock price trend is bullish and most volatile of the three events. Figure 2c shows that stock price movements also reacted positively after March 30, 2020, but the growth rate was slower and more stable than on January 23, 2020. In contrast to the first event and the third event, the cumulative abnormal return after March 6, 2020 were negative (Figure 2b). This is an interesting finding about the impact of Covid-19 on the share price of the pharmaceutical industry in Vietnam compared to the industry's research results on the Australian, Chinese and Indian stock markets (Al-Awadhi et al. 2020; Alam et al. 2020; He et al. 2020; Mittal, Sharma 2021).

Table 1. Results and t-statistic test of abnormal return (AR) for event dates

	01/23/2020		03/06/2020		03/30/2020	
	AR	t-test	AR	t-test	AR	t-test
-10	-0.013	-2.133**	-0.002	-0.304	-0.005	-0.637
-9	0.008	1.265	0.000	0.061	-0.020	-2.472**
-8	-0.006	-1.076	-0.002	-0.222	0.005	0.639
-7	-0.004	-0.693	-0.006	-0.839	-0.010	-1.226
-6	0.007	1.210	0.000	0.061	0.004	0.523
-5	-0.002	-0.271	-0.008	-1.098	-0.024	-2.965***
-4	-0.009	-1.519	-0.007	-0.896	0.002	0.223
-3	0.005	0.793	-0.005	-0.736	0.018	2.267

-2	0.006	0.944	-0.002	-0.298	0.000	-0.030
-1	-0.002	-0.349	0.007	0.967	-0.012	-1.441
0	0.000	0.027	0.009	1.189	-0.006	-0.686
1	0.027	4.567***	-0.042	-5.667***	-0.002	-0.190
2	0.052	8.699***	0.003	0.345	0.003	0.315
3	0.021	3.586***	-0.005	-0.690	0.010	1.193
4	-0.025	-4.248***	-0.046	-6.198***	0.014	1.769*
5	-0.030	-4.992***	-0.012	-1.595	0.000	-0.048
6	-0.015	-2.459**	-0.010	-1.375	0.007	0.887
7	0.005	0.816	-0.021	-2.836***	0.017	2.103**
8	0.030	5.055***	0.006	0.747	0.010	1.300
9	-0.007	-1.142	-0.018	-2.402**	0.005	0.574
10	0.002	0.311	-0.002	-0.252	0.001	0.131

Source: Author's calculations
*Notes: *, **, *** have statistical significance of 10%, 5%, 1% respectively.*

Table 2. Results and t-statistic test of cumulative abnormal return (CAR) for event dates

	01/23/2020		03/06/2020		03/30/2020	
[-t;0)	CAR	t-test	CAR	t-test	CAR	t-test
-10	-0.011	-0.579	-0.024	-1.047	-0.041	-1.623
-9	0.002	0.102	-0.022	-1.002	-0.036	-1.497
-8	-0.006	-0.340	-0.023	-1.084	-0.016	-0.713
-7	0.001	0.044	-0.021	-1.075	-0.021	-1.004
-6	0.005	0.331	-0.015	-0.818	-0.012	-0.583
-5	-0.002	-0.180	-0.015	-0.923	-0.016	-0.872
-4	-0.001	-0.065	-0.007	-0.482	0.008	0.510
-3	0.008	0.803	0.000	-0.039	0.006	0.460
-2	0.004	0.422	0.005	0.474	-0.012	-1.043
(0;t]	CAR	t-test	CAR	t-test	CAR	t-test
2	0.079	9.400***	-0.039	-3.771***	0.001	0.088
3	0.100	9.750***	-0.044	-3.479***	0.011	0.762
4	0.075	6.315***	-0.090	-6.118***	0.025	1.547
5	0.045	3.411***	-0.102	-6.187***	0.025	1.362
6	0.031	2.108**	-0.112	-6.211***	0.032	1.606
7	0.036	2.261**	-0.133	-6.824***	0.049	2.283**
8	0.066	3.906***	-0.128	-6.119***	0.059	2.596***
9	0.059	3.301***	-0.145	-6.571***	0.064	2.640***
10	0.061	3.230***	-0.147	-6.314***	0.065	2.546**

Source: Author's calculations
*Notes: *, **, *** have statistical significance of 10%, 5%, 1% respectively.*

Table 1 and Table 2: Presentation of results and t-statistic test of extraordinary profit (AR) and cumulative extraordinary profit (CAR) for event dates

First event: January 23, 2020.

Before the first event day, the day Vietnam discovered the first patient infected with Covid-19, neither abnormal return (AR) and cumulative abnormal return (CAR) for Pharmaceutical sector shares were insignificant. After the event date, the daily abnormal returns t = $\overline{1:3}$ and t = 8 are both positive with AR [1] = 2.7%; AR [2] = 5.2%; AR [3] = 2.1% and AR [8] = 3.0% and statistically significant 1%. Abnormal returns from date t = $\overline{4:6}$ are all negative with AR [4] = -2.5%; AR [5] = -3.0%; AR [6] = -1.5% and statistically significant are 1%, 1% and 5%, respectively. Cumulative abnormal return CAR (0; 2] later is all positive and statistically significant 1%. Cụ thể CAR (0;2) = 7.9%; CAR (0;3) = 10%; CAR (0;4) = 7.5%; CAR (0;5) = 4.5%; CAR (0;6) = 3.1%; CAR (0;7) = 3.6%; CAR (0;8) = 6.6%; CAR (0;9) = 5.9%.

Before Vietnam found the first case positive for Covid-19 and on the event date, the abnormal return and cumulative abnormal return were not statistically significant. It shows that the expected return is still matching with the real return on the stock price of Pharmaceutical industry. The Pharmaceutical industry's share price did not respond to the event as at 23 January 2020 when neither AR nor CAR was statistically significant. However, immediately after the fact that the stock price of Pharmaceutical industry increased for three consecutive days, leading to abnormal returns AR [1], AR [2] and AR [3] were all statistically significant and in the range from 2.1% to 5.2%; Cumulative abnormal return CAR (0; 2) = 7.9% and CAR (0; 3) = 10%. On the contrary, returns of the corresponding VNIndex during these days are -3.3%; -2.4% and -0.9%. This result shows that the share price of Pharmaceutical industry responded strongly positively after the day when Vietnam first discovered the patient positive for Covid-19. It supports the study of Al-Awadhi et al. (2020); Alam et al. (2020); He et al. (2020); Mittal, Sharma (2021) and additional empirical evidence for Vietnam's stock market. Investors have focused on buying shares of pharmaceutical industry because they think that during the epidemic period, the need to protect the health of the people increases will bring sudden profits for these businesses. However, the sharp decline of the general index, the VNIndex and the sharp increase in the healthcare industry's share price in days t = = $\overline{1:3}$ made the Pharmaceutical industry index correct in the next three trading days because of abnormal return AR [4], AR [5] and AR [6] are statistically significant and range from -1.5% to -3.0%. This price adjustment is significantly lower than the previous three days of strong price increases. This result made the cumulative abnormal return CAR (0; 2) to CAR (0; 9) were both positive and statistically significant. In general, the share price of the pharmaceutical industry has gone against the general trend of the market and responded positively after January 23, 2020 when Vietnam discovered the first Covid-19 patient.

Second event: March 6, 2020

An international student from the UK who was confirmed positive for Covid-19 virus on March 6, 2020 started this wave of virus infection in the community in Vietnam. Similar to the first event, both the abnormal return and the cumulative abnormal return of the pharmaceutical industry's shares were not statistically significant until March 6, 2020. The trading days after the second event, abnormal return are mostly negative but only 4/9 days in the event window have statistical significance including: AR [1] = -4.2%, AR [4] = -4.6%; AR [7] = -2.1% and AR [9] = -1.8%. Cumulative abnormal return after March 6, 2020 is negative and has statistical significance of 1%, including: CAR (0; 2) = -3.9%; CAR (0; 3) = -4.4%; CAR (0; 4) = -9.0%; CAR (0; 5) = -10.2%; CAR (0; 6) = -11.2%; CAR (0; 7) = -13.3%; CAR (0; 8) = -12.8%; CAR (0; 9) = -14.5%.

The second wave of Covid-19 infection in Vietnam is a surprise to investors because of both abnormal returns and the cumulative abnormal return on the trading days from March 6, 2020 or earlier in the event window frame is

not statistically significant. It shows that the pharmaceutical industry's stock price did not respond immediately to the event. Abnormal returns AR [1]; AR [4]; AR [7] and AR [9] both have statistical significance of 1% and the value ranges from -1.8% to -4.6%. This reaction of the pharmaceutical industry's stock price is in stark contrast to its response after January 23, 2020. The sharp decline in the share price of this industry when the second wave of Covid-19 virus infection in the community appeared in Vietnam could be explained by two reasons. First, when the number of patients with Covid-19 increased rapidly in many countries, on 11/3/2020 WHO declared Covid-19 a global pandemic. This causes the pessimism of investors to increase rapidly with a wide range, leading to a sharp decline in prices on the stock market. Secondly, Vietnam's pharmaceutical industry has a shortage of imported materials because Covid-19 has broken the supply chain, so they cannot exploit their own advantages during the epidemic. Vietnam closed its land border with China since the end of January 2021. While this is the largest import market for raw materials for pharmaceutical companies. According to the financial statements at the end of 2019, there are only three listed pharmaceutical companies whose raw material value is over 40% of the demand in 2020, including: OPC (62.2%), TRA (41.5%), PME (40.8%). The negative reaction of pharmaceutical stocks to the March 6, 2020 event in Vietnam is the new finding of this study compared to the studies of Alam et al. (2020) in Australia; Al-Awadhi et al. (2020) and He et al. (2020) in China; Mittal, Sharma (2021) in India.

Third event: March 30, 2020

After detecting a covid 19-positive patient in many provinces and cities nationwide, on March 30, 2020, Vietnam announced the nationwide epidemic of Covid-19 and immediately followed the economic lockdown. In the event window [-9; 9], the pharmaceutical sector only reacted on [4,7]. Abnormal returns AR [4] = 1.4% and AR [7] = 1.7% with statistical significance of 10% and 5%, respectively. Cumulative abnormal return CAR (0; 7) = 4.9%, CAR (0; 8) = 5.9% and CAR (0; 9) = 6.4% have statistical significance of 5%, 1% and 1%, respectively.

Similar to the two previous events, the abnormal returns and the cumulative abnormal return were not statistically significant at the Vietnam national epidemic announcement date suggesting that the pharmaceutical industry's stock price did not immediately respond to the news. this news. Similar to the two previous events, abnormal returns and cumulative abnormal returns were not statistically significant on the day the Prime Minister announced the disease nationwide. It shows that the pharmaceutical industry's stock price did not respond immediately to this information. Compared to the past two events, pharmaceutical stocks react more slowly to the third event when an abnormal returns exists starting from day t = 4 and cumulative abnormal return exist starting from day t = 7. Besides, the reaction of investors to pharmaceutical stocks this time was positive when AR [4], AR [7], CAR (0; 7), CAR (0; 8), CAR (0; 9) are both positive and statistically significant. The higher the cumulative abnormal return is, CAR (0; 7) = 4.9% <CAR (0; 8) = 5.9% <CAR (0; 9) = 6.4% shows the share price of pharmaceutical industry maintain momentum for days after the event announcement date. This result can be explained that when the economy is locked down due to the epidemic, most businesses in the economy have to close their business activities. However, in Vietnam, pharmacies are still allowed to operate under strict control. The privilege of not having to close pharmacies during the lockdown period is a favorable condition for pharmaceutical stocks to rise after this event. The reaction of the pharmaceutical industry's stock price to this event is similar to the results on the Australian, Chinese and Indian stock markets (Alam et al. 2020; Al-Awadhi et al. 2020; He et al. 2020; Mittal, Sharma 2021).

Conclusions

To examine the impact of the Covid-19 epidemic on pharmaceutical stock prices, this article uses three different events related to the evolution of the Covid-19 epidemic in Vietnam in 2020 on the pharmaceutical industry index.

The three events used in this article are: (i) January 23, 2020, the first discovery of a Covid-19-positive foreign patient; (ii) March 6, 2020: a citizen from the UK has been infected with the virus, opening a wave of Covid-19 infection in the community in Vietnam; (iii) On March 30, 2020, Vietnam announced a nationwide outbreak of Covid-19. The results showed that the pharmaceutical industry's share price mainly reacted after the date of the announcement. The differences of the results of this study compared with the study of Alam et al (2020) in Australia; Al-Awadhi et al. (2020) and He et al. (2020) in China; Mittal & Sharma (2021) in India is the share price of Vietnam's pharmaceutical industry that reacted negatively after the second event date (March 6, 2020). The significant decline in stock prices following the event could be attributed to negative investor sentiment and internal problems (lack of raw materials) of listed pharmaceutical companies. It implies that Vietnamese pharmaceutical enterprises need to have effective solutions for proactive and divers input of material sources. Cumulative abnormal returns were positive and statistically significant after the first and third event announcement were similar to the results from studies on the Australian, Chinese and India stock exchanges (Al-Awadhi et al. 2020; Alam et al. 2020; He et al. 2020; Mittal, Sharma 2021).

The reaction of pharmaceutical stock prices to inconsistent (positive, negative) signs with Covid-19-related events in Vietnam in 2020 implied that equity investment in potentially unexpected events. Risks. Hence, it is more suitable for venture capitalists. Understanding investment psychology, updating industry and business information will help investors reduce the risk of their decisions.

Although this study has pointed out new points and similarities about the impact of Covid-19 on Vietnam's pharmaceutical industry's share price compared to previous studies. However, this result is mainly focused on pharmaceutical companies being listed on the Vietnamese stock market, but not including unlisted pharmaceutical companies. This is the limitation of this study and also a suggestion for the next research direction.

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