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The Impact of COVID-19 on Stock Price: An Application of Event Study Method in Vietnam

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Abstract

Vietnam's Oil and gas industry make a significant contribution to the Gross Domestic Product of Vietnam. The ongoing COVID-19 pandemic has hit every industry hard, but perhaps the one industry which has taken the biggest hit is the global oil and gas industry. The purpose of this article is to examine how the COVID-19 pandemic affects the share price of the Vietnam Oil and Gas industry. The event study method applied to Oil and Gas industry index data around three event days includes: (i) The date Vietnam recognized the first patient to be COVID-19 positive was January 23, 2020; (ii) The second outbreak of COVID-19 infection in the community began on March 6, 2020; (iii) The date (30/3/2020) when Vietnam announced the COVID-19 epidemic in the whole territory. This study found that the share price of the Vietnam Oil and Gas industry responded positively after the event (iii) which is manifested by the cumulative abnormal return of CAR (0; 3] = 3.8% and statistically significant at 5 %. In the study, event (ii) has the most negative and strong impact on Oil and Gas stock prices. Events (i) favor negative effects, events (iii) favor positive effects, but abnormal return change sign quickly from positive to negative after the event date and statistically significant shows the change on investors' psychology.

Keywords: Abnormal Return, Lockdown, Oil and Gas Industry, Stock Market

JEL Classification Code: G01, G14, G21, G40

1. Introduction

Global economic growth fell 4.3% in 2020 (World Bank, 2021) due to the negative impact of the COVID-19 pandemic (WHO, 2020). Besides, the road and air transport sectors have seriously declined due to the COVID-19 pandemic causing the demand for gasoline to fall sharply. As a result of the COVID-19 pandemic, many countries and regions have imposed quarantines, entry bans, or other restrictions for citizens of or recent travelers to the most affected areas. Other countries and regions have imposed global restrictions that apply to all foreign countries and territories or prevent their citizens from traveling overseas. Moreover, the supply of Oil and Gas industry also creates pressure on crude oil

prices when the OPEC+ production cut agreement took place in early March 2020 (Worldbank, 2020) failed. The dual effects from both the supply and the demand side caused crude oil prices to plummet in 2020, but the role of this energy source is still very important to the growth of many countries around the world (World Bank, 2018) so the topic related to the Oil and Gas industry still attracts the attention of scholars around the world.

With the outbreak of the COVID-19 epidemic in many countries, many scholars have studied the impact of COVID-19 on the energy sector. Studies often focus on the world's leading economies such as the United States (Mazur et al., 2020), China (Fu & Shen, 2020), and major Asian economies such as China, India, Japan, and Korea (Prabheesh et al., 2020); developed countries in G7 (Yamini, 2020), countries with large oil export volume in the world such as Russia (Connolly et al., 2020), countries with developed stock market (Mazur et al., 2020; Prabheesh et al., 2020; Yamini 2020). For developing countries, there have been several studies on the impact of Covid-19 on some sectors/companies on the stock market (Alam et al., 2020; Khanthavit, 2020; Herwany et al., 2021) but they did not mention the Oil and Gas industry. It can be seen that research on this topic in developing countries, incapable of influencing the world oil market, the stock

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market at the marginal level is still limited. COVID-19 has had major impacts on the oil and gas sector. The spread of this virus has forced many oil and gas companies to either stop or slow down their physical operations, which has impacted production in both upstream and downstream operations. The industry must now not only become more resilient - it must play a part in the global effort to build back better.

Petro Vietnam Group (Petro Vietnam) continuously holds the first position in the Top 500 most profitable enterprises in Vietnam for the period of 2018–2020 (Vietnam Report, 2020). From 2015, despite many difficulties, Petro Vietnam's annual payment to the State budget accounts for 9–11% of the total budget revenue and accounts for 16.5–17% of the total central budget revenue (An, 2020). It shows that the performance of this Group will directly affect GDP growth, energy security, national security, and State budget revenue of Vietnam.

The article selects three events related to the evolution of the COVID-19 epidemic in Vietnam in the early months of 2020 to consider its impact on the stock price of the Oil and Gas industry. An event study is an empirical analysis that examines the impact of a significant catalyst occurrence or contingent event on the value of a security, such as company stock. An event study is used to study three events including (i) The date Vietnam recognized the first patient to be COVID-19 positive was January 23, 2020; (ii) The second outbreak of COVID-19 infection in the community began on March 6, 2020; (iii) The date (30/3/2020) when Vietnam announced the COVID-19 epidemic in the whole territory on. Research results show that for the majority of days after the event dates, abnormal returns are statistically significant, but the only event (ii) has the most negative and strong impact on Oil and Gas stock prices while the other two events have changing signs from negative to positive (event i) or changing signs from positive to negative (event iii). The days after the event (i) and (ii), cumulative abnormal return CAR from $t = (0; 2]$ to $t = (0; 5]$ is negative and ranges from -9.4% to -2.5% . On the contrary, CAR $(0; 3] = 3.8\%$ for event (iii) which is positive and statistically significant at 5%. It shows the reaction of the stock price of the Vietnam Oil and Gas industry to the event (iii) is different from the studies of Alam et al. (2020), Mazur et al. (2020), Polemis and Soursou (2020), and Yamini (2020). This difference may be due to the investors' decision after the event date is influenced by psychological factors. Events (i) and (ii) both negatively impact the stock of this industry, but event (ii) has the strongest impact on research events.

Contribution of the research: Compared to studies that have been done on the energy sector in developed countries and major economies, this paper explores by looking at the impact of the COVID-19 pandemic on the stock price of Vietnam's Oil and Gas industry - a developing economy with low middle income and subject to world oil prices. The use of three different event days (at least three weeks between two consecutive events) in relation to the COVID-19 development in Vietnam has been

more favorable than previous studies of the same topic because it is possible to compare the reaction of oil and gas stock prices between events. Research has found the reaction of oil and gas's stock price changes from event to event. Understanding the reaction of the stock price to the movement of the COVID-19 pandemic will be an experience for policymakers to prepare plans, who decide to react promptly and adjust their strategies to minimize losses with similar events.

2. Literature Review

The price of goods can be explained by the law of supply and demand in classical economic theory. In other words, the price of a good tends to increase with decreasing supply and/or increasing demand. Besides, efficient market theory, imperfect substitution theory, and behavioral finance theory are also often used to explain stock price reactions in the stock market. The efficient market theory holds that share prices reflect all information (Malkiel & Fama, 1970). The theory of imperfect substitution states that buying and selling large quantities of stocks shifts the demand curve into a new equilibrium because stocks do not have perfect change for each other (Shleifer, 1986). Behavioral finance is the study of the influence of psychology on the behavior of investors or financial analysts. It focuses on the fact that investors are not always rational, have limits to their self-control, and are influenced by their own biases. Behavioral finance theory emphasizes psychological factors that can influence economic behavior so stock prices can change without changing the financial factors of the company (Chambers & Bailey, 1996; Shiller, 2003).

COVID-19 has a serious impact on the crude oil market. By April 2020, the price of crude oil decreased by 2/3 since January 21, the day the WHO confirmed COVID-19 could be transmitted from person to person (World Bank, 2020). The crude oil market has been double impacted by both a negative demand and a positive supply shock. On the demand side, measures to limit the COVID-19 infection such as restricting travel, implementing blockade, and lockdown of the economy caused traffic interruption and economic downturn. Global economic growth in 2020 decreased to -4.9% compared to 2019 (IMF, 2020) and reduced global oil consumption. Because the price of crude oil has a relatively high-income elasticity of demand, a slowdown in economic growth could lead to a decrease in oil demand (World Bank, 2018). On the supply side, the OPEC + production cut deal breakout in early March 2020 exacerbated the ongoing oil price decline, with a 24% decline a day after the announcement (World Bank, 2020). The parallel supply and demand shock caused crude oil prices to plummet. In 2020, oil demand fell by 6 million barrels/day (6%) in Q1, dropped by 29 million barrels/day in April 2020, and 26 million barrels/day in May 2020 to the lowest level in 25 years and 30% lower than global demand before the outbreak of COVID-19 (IEA, 2020).

Research on the world's two largest economies by Mazur et al. (2020) and Fu and Shen (2020) have the same view that COVID-19 has a negative impact on both stock prices and the business performance of the Oil and Gas industry. Mazur et al. (2020) investigated the US stock market performance during the March 2020 crash caused by COVID-19. The results showed that gasoline and crude oil share prices are negatively affected by COVID-19. In particular, companies operating in the crude oil sector were the hardest hit and lost more than 60% of their market value in a day.

Fu and Shen (2020) used financial data of listed companies in China's energy industry from 2014 to 2020 to study the impact of COVID-19 on corporate performance. The findings revealed that COVID-19 affects energy sector competitiveness, resulting in a significant drop in revenue for firms. The negative effect of the pandemic can be seen in the performance of energy companies, especially in the first quarter of 2020.

For the developed economies, Yamini (2020) studies the impact of COVID-19 on the share returns of oil and gas companies in G7 countries (US, UK, Germany, Canada, Japan, France, and Italy). Yamini (2020) showed that most of the business results of oil and gas enterprises in the first quarter of 2020 were low, but their stock prices all recovered in April 2020 after a big loss in March 2020. Yamini (2020) also emphasized that this result can be influenced by the psychological factor of investors and this result supports behavioral finance theory.

For the major Asian economies, Prabheesh et al. (2020) studied the relationship between stock price returns and oil price returns in major net oil-importing Asian countries (including China, India, Japan, and Korea) in the COVID-19 period. The results of Prabheesh et al. (2020) show evidence of a positive movement between oil price returns and stock price returns over the COVID-19 period (the first 6 months of 2020). Therefore, Prabheesh et al. (2020) argued that the fall in oil prices acted as a negative signal for the stock market.

Research for each developed country such as Australia and Greece, the results of COVID-19's impact on energy stocks are mixed. Using the method of event study (event study) on the Australian stock market at the industry level, Alam et al. (2020) showed that the energy sector and the transport sector were negatively affected when the country announced the COVID-19 boom. Polemis and Soursou (2020) assessed the impact of the COVID-19 pandemic on Greek energy companies. The results show that with the event window of [-10; 10] days and separated from the event date, the effect of COVID-19 is dissipated (Polemias & Soursou, 2020).

Stock prices' volatility always affects the investor's confidence in the stock market, especially during a crisis period whether it's the 2008 crisis or the Wall Street Crisis of 1929. Every crisis has a different story and its impact on the stock market is also different, some crisis affects the overall market and some others affect some specific sectors of the stock market. Also, some crisis impact globally or some crisis impacts only a

specific country. This COVID-19 crisis is somehow different from the earlier crisis on the basis that it is not only affecting the stock market, but also the economy on a global level.

In Vietnam, the Oil and Gas industry is dominated by the Vietnam National Oil and Gas Group (Petro Vietnam), under the supervision of the Ministry of Industry and Trade in both operations and operations in this industry. Petro Vietnam's production and business activities are divided into three main activities: upstream, midstream, and downstream, performed by its subsidiaries. Upstream specializes in exploration and exploitation. The middle source involves the pipeline, transportation, and storage system. Downstream includes refining-petrochemical and the distribution of treated gas, products, and related product sales. In which, Petro Vietnam holds at least 20% shares of its subsidiaries (SBSC, 2020). In the first three months of 2020, the COVID-19 pandemic has seriously affected almost every economy in the world, including Vietnam.

According to Petro Vietnam, although the total output of oil in the first quarter of 2020 of the corporation increased, the price and demand for crude oil both fell sharply making the Group's business performance targets decrease compared to the 2020 plan and compared to the same period in 2019. In Q1 / 2020, Petro Vietnam's total oil production exceeded 10.1% of the Q1 plan and equal to 26.6% of the annual plan. However, the average crude oil price in Q1 / 2020 decreased by 3.8 USD / barrel, equivalent to a 6% decrease, compared to the target price in 2020 (60 USD / barrel); decreased by 9.1 USD / barrel, equivalent to a decrease of 14%, compared to the average price in Q1 / 2019 (65.3 USD / barrel) (PVN, 2020). Besides, Vietnam's total petroleum demand in the first quarter of 2020 decreased by 30% and the downward trend is likely to continue when the entire tourism, service, and transportation market is frozen before the social isolation bridge. These reasons lead to the Q1/2020 revenue of Petro Vietnam reaching 165 trillion dong, equaling 90.9% of the first quarter plan and equal to 25.7% of the annual plan; submit to the state budget 20.8 trillion dong, equaling 89.7% of the first quarter plan and equal to 25.3% of the annual plan (PVN, 2020).

The world oil price and the sharp drop in domestic demand for oil have made downstream firms such as Dung Quat oil refinery and Nghi Son oil refinery have large inventories. As of 30/3/2020, crude oil inventories of these two factories are 76% and 64% respectively, and gasoline inventories are 87% and 81% respectively. This fact has caused the refineries to suffer great pressure from both inputs (reduction in crude oil inventory prices), and output (difficult to consume) (SBSC, 2020). However, in the period from the end of March to the beginning of April 2020, gasoline prices in Vietnam decreased according to world gasoline prices and dropped to the lowest level in 11 years (MOIT, 2020; Hung, 2020) and there was a false rumor that the gas stations will be closed to prevent the COVID-19 epidemic. Hence, people in many provinces such as Son La, Dien Bien, Nghe

An, Quang Nam, Dak Lak started buying gasoline in large quantities for storage. More than 30,000 liters of petroleum were sold only on March 30, 2020, in two highland communes of Daklak province, Cu Pui and Cu Dram (Ha, 2020). The storing of gas and oil at home has a potential risk of fire and explosion, endangering people's lives and property. Furthermore, people purchasing petroleum in huge quantities would raise the risk of infection, disease transmission, and failure to follow disease prevention and control COVID-19. After being propagated by the functional forces, people understood that gas stations are open 24 hours a day and have enough sources of goods to serve; in no case, the gas station was closed to fight the COVID-19 epidemic.

For companies upstream that are oil and gas exploration and production companies such as PVD, PVS, and PVB, the double impact of COVID-19 transmission and low oil prices significantly affects their prospects. However, due to the project-driven nature, the impact of falling oil prices will not be immediately reflected, but there may be a delay due to the business nature of these companies.

3. Research Models

An event study is a statistical method to assess the impact of an event on the value of a firm. An event study is an empirical analysis that examines the impact of a significant catalyst occurrence or contingent event on the value of a security, such as company stock. Event studies can reveal important information about how a security is likely to react to a given event. The event research method is used to analyze the data. This method is often used to study the response of a security's price to a publicly announced event. Usually, this method is done in steps.

Step 1: Calculate the daily gross profit of the industry index using formula (1)

$$\text{Return}_t = \ln (P_t / P_{t-1}) \quad (1)$$

In which P_t and P_{t-1} are closing prices of Oil and Gas industry at day t and date $(t-1)$; \ln is the natural logarithm of P .

Step 2: Calculate the expected return using Brenner's market model (1979) using formula (2)

$$E(\text{Return})_t = \alpha + \beta * R_{\text{VNIndex},t} \quad (2)$$

Step 3: An abnormal return is the difference between the gross daily profit and an expected profit. This indicator is calculated by the formula (3)

$$\text{AR}_t = R_{it} - E(\text{Return})_t \quad (3)$$

Step 4: Based on the extraordinary profit to calculate the extraordinary profit accumulated according to the formula (4)

$$\text{CAR}(t_1, t_2) = \sum_{t=t_1}^{t_2} \text{AR}_{it} \quad (4)$$

Step 5: The t -statistic test is used for the extraordinary and the accumulated extraordinary returns for each event window.

The t -test is used to examine how the movements of COVID-19 in Vietnam affect the stock price of the Oil and Gas industry. T -statistics are calculated at different timelines in each event window for easy comparison.

Event date

Mazur et al. (2020) and Polemis and Soursou (2020) both used the period in March 2020 to research the impact of COVID-19 on the stock price of the Oil and Gas industry. For this month, Mazur et al. (2020) used 3 different event days over one week, Polemis and Soursou (2020) used only one event. To limit overlapping effects between events, the time interval between events should not be too close (Phuong, 2021a). Therefore, this article uses three different events in the first 3 months of 2020, and the minimum time between two consecutive events is 3 weeks. The three events studied in the article include: Vietnam discovered the first patient positive for COVID-19 on January 23, 2020 (Loc, 2020); March 6, 2020, opening the second wave of infections in the community in Vietnam (MOH, 2020); Vietnam announced the COVID-19 epidemic in the whole territory on March 30, 2020 (Minh, 2020).

Estimated window

Phuong (2021b) used one-year trading data before the event date as the estimated window when studying the effect of COVID-19 on stock prices in the stock market. The estimated window for this article is used in the same way as these authors.

Event window

The fact that the event window is too long can reduce the power of the statistic (Brown & Warner 1980, 1985), so this article uses $[-5; 5]$ days for each event date as the event window.

Data

The oil and gas industry index is calculated by FiinPro Company (<http://fiinpro.com/>). FiinPro is an application-based platform providing the most accurate, timely and in-depth financial database and use analytics tools for professionals so they can feel the market pulse at their fingertips. The oil and gas industry index is calculated by daily frequency, based on the proportion of market capitalization of

each share to the total capitalization of all companies in the industry. These companies are listed on the Ho Chi Minh City Stock Exchange or the Hanoi Stock Exchange. Oil and Gas industry index data and VNIndex will be used in this study.

4. Research Results

Compared to the closing price on December 31, 2019, except for the period before January 10, 2020, the Oil and Gas industry index was higher than the VNIndex the rest of the time. Figure 1 shows the industry index Oil and gas in the first months of 2020 decreased more than the decrease rate of the VNIndex. The first sharp decline of the Oil and Gas industry index took place on February 3, 2020, when it decreased by 11% compared to the end of 2019. Next, on March 13, 2020, this industry lost 32% of its value, and on March 31, 2020, 36% of its value compared to the closing price on December 31, 2019. The three big downtrends in the Oil and Gas industry index in the first three months of 2020 are quite closer to the three events investigated in this article.

January 23, 2020_event (i)

When Vietnam announced the first discovery of a COVID-19-positive patient on January 23, 2020, the abnormal return (AR) and cumulative abnormal return (CAR) at the event date were not statistically significant. Before the event date, cumulative abnormal return CAR $[-3; 0] = 2.7\%$; CAR $[-2; 0] = 3.1\%$; Abnormal return AR $[-1] = 2.8\%$ and statistically significant 10%, 5% and 1%, respectively. After the event date, the abnormal return AR $[2] = -2\%$; AR $[3] = -4.2\%$ and AR $[5] = 1.6\%$ with statistical significance of 5%, 1% and 10%, respectively; CAR are both less than zero and are statistically significant from the range $t = 0:2$ to $t = 0:5$. Specifically, CAR $(0; 2] = -2.5\%$;

CAR $(0; 3] = -6.8\%$; CAR $(0; 4] = -6.1\%$; CAR $(0; 5] = -4.5\%$ and statistically significant at 10%, 1%, 1%, 1% and 1% respectively.

Since January 23, 2020, which is the 29th of December of the Lunar New Year, coinciding with the longest Tet holiday of the year in Vietnam, $t = 0$ is used as of January 22, 2020. Abnormal returns not statistically significant at day $t = 0$ are logical. Cumulative abnormal return CAR $[-3; 0] = 2.7\%$, CAR $[-2; 0] = 3.1\%$, and abnormal returns AR $[-1] = 2.8\%$ are both positive and significant on pre-event data showing that investors are having positive sentiment about stock price before the holiday season. This result is consistent with Phuong (2018) on the Vietnamese stock market, saying that investors often have a positive sentiment before the holidays, and this is reflected in stock prices. As such, sentiment before the Lunar New Year holiday likely influenced the Oil and Gas industry's stock price before January 23, 2020, instead of the initial information about the COVID-19 pandemic. After the event date, and after the Lunar New Year holiday, the Vietnamese stock market started to trade again. The oil and Gas industry's stock price fell for 2 consecutive trading days after the event date, but only two days that $t = 2$ and $t = 3$ are statistically significant. Abnormal return AR $[2] = -2\% < AR [3] = -4.2\%$ and cumulative abnormal return CAR $(0; 2] = -2.5\% > CAR (0; 3] = -6.8\%$ for Investors' concerns about COVID-19 that had been accumulated in the past were reflected in the share price. However, after three days of decline, stock prices have recovered and abnormal return AR $[5] = 1.6\%$, statistically significant at 10%, made cumulative abnormal return CAR $(0; 4] = -6.1\%$ and CAR $(0; 5] = -4.5\%$, both have absolute lower value than CAR $(0; 3] = -6.8\%$. It showed oil and gas stock prices fell rapidly and recovered quickly.

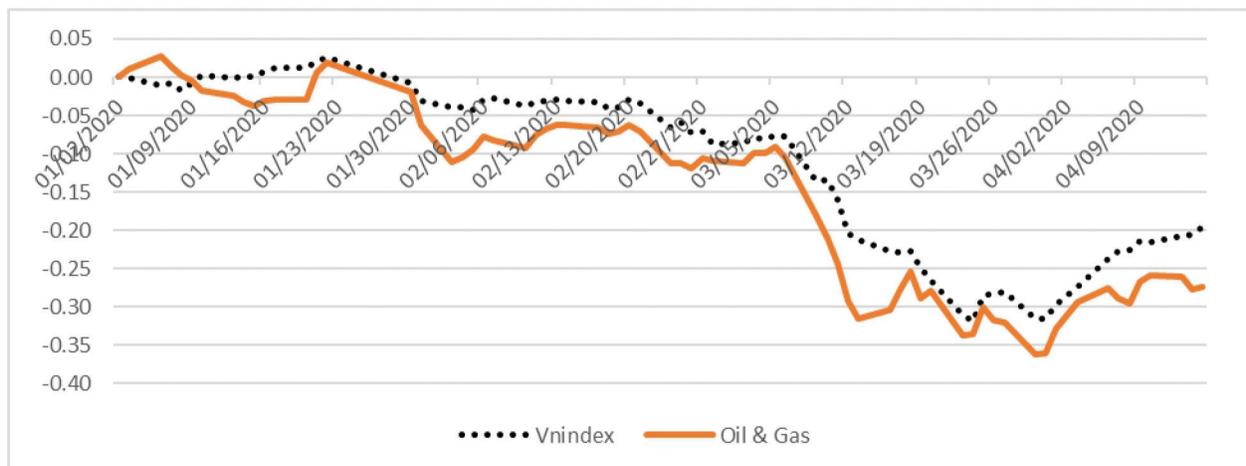


Figure 1: Chart of VNIndex and Vietnam Oil and Gas Industry Index in Early 2020 Compared to the Closing Prices of these Two Indices on December 31, 2019

Table 1: Results of Abnormal Returns (AR) and *t*-sign for Each Event Window

<i>t</i>	01/23/2020		03/06/2020		03/30/2020	
	AR	<i>t</i> -sign	AR	<i>t</i> -sign	AR	<i>t</i> -sign
-5	-0.007	-0.717	0.017	1.773*	-0.009	-0.971
-4	0.002	0.260	-0.005	-0.564	0.016	1.646
-3	-0.004	-0.380	0.008	0.839	-0.002	-0.202
-2	0.002	0.255	0.004	0.383	-0.030	-3.070***
-1	0.028	3.061***	0.005	0.484	-0.005	-0.516
0	0.008	0.849	-0.013	-1.384	-0.005	-0.544
1	-0.005	-0.592	-0.018	-1.895*	0.005	0.556
2	-0.020	-2.156**	-0.038	-4.053***	0.017	1.765*
3	-0.042	-4.614***	-0.009	-0.967	0.015	1.529
4	0.006	0.694	-0.006	-0.620	-0.029	-3.023***
5	0.016	1.728*	-0.024	-2.583***	-0.033	-3.374***

Note: ***, ** and * Indicates significant at 1%, 5% and 10% level of significance based on *t*-statistics.

Table 2: Cumulative Abnormal Return and *t*-sign Results of Each Event Window

<i>t</i>	01/23/2020		03/06/2020		03/30/2020	
	AR	<i>t</i> -sign	AR	<i>t</i> -sign	AR	<i>t</i> -sign
[-5; 0)	0.023	1.110	0.027	1.307	-0.030	-1.395
[-4; 0)	0.029	1.601	0.011	0.572	-0.021	-1.073
[-3; 0)	0.027	1.698*	0.016	0.987	-0.037	-2.192**
[-2; 0)	0.031	2.349**	0.008	0.615	-0.035	-2.541**
(0; 2]	-0.025	-1.947*	-0.055	-4.215***	0.023	1.645
(0; 3]	-0.068	-4.259***	-0.064	-4.001***	0.038	2.228**
(0; 4]	-0.061	-3.341***	-0.070	-3.775***	0.008	0.415
(0; 5]	-0.045	-2.214**	-0.094	-4.534***	-0.025	-1.141

Note: ***, ** and * Indicates significant at 1%, 5% and 10% level of significance based on *t*-statistics.

March 6, 2020 event (ii)

5 trading days before the time when Vietnam discovered that patient number 17 was positive for COVID-19, the abnormal return $AR[-5] = 1.7\%$ and statistically significant 10%. On the event date of March 6, 2020, the Oil and Gas industry's stock price decreased, the abnormal return $AR[0] = -1.3\%$ but it was not statistically significant. After the event, the stock prices of this industry all fell, abnormal return $AR[1] = -1.8\%$; $AR[2] = -3.8\%$; $AR[5] = -2.4\%$ at statistical significance levels of 10%, 1%, and 1%, respectively. With the statistical significance of all 1%, after March 6, 2020, the cumulative abnormal return of oil and gas stocks from $t = 0:2$ đến $t = 0:5$ as the value is $CAR(0; 2) = -5.5\%$ respectively; $CAR(0; 3) = -6.4\%$; $CAR(0; 4) = -7.0\%$; $CAR(0; 5) = -9.4\%$.

Before it was discovered that patient number 17 was positive for COVID-19, the Oil and Gas industry's stock price fluctuated slightly in a positive direction, but the only abnormal return on day $t = -5$ was $AR[-5] = 1.7\%$ with 10% statistical significance level. Since March 6, 2020, Vietnam has continuously detected COVID-19 infectious patients in the community in many provinces of Vietnam. In 5 trading days since the second event, the Oil and Gas industry's share price reacted negatively. Abnormal return and cumulative abnormal return are both less than zero, but only $AR[1]$, $AR[2]$, $AR[5]$ in the range $[-2.4\%; -1.8\%]$ is significant. In the event window, the farther away the abnormal return is from the lower value event $CAR(0; 2) = -5.5\% > CAR(0; 3) = -6.4\% > CAR(0; 4) = -7.0\% > CAR(0; 5) = -9.4\%$ shows that it supports imperfect substitution theory.

March 30, 2020_ event (iii)

As at 3/30/2020, when the Prime Minister of Vietnam announced the disease of COVID-19 nationwide, the abnormal return AR was not statistically significant. The abnormal return before the announcement date is $AR [-2] = -3\%$, the cumulative abnormal return $CAR [-3; 0] = -3.7\%$; $CAR [-2; 0] = -3.5\%$ and is statistically significant at 1%; 5% and 5%. After the event date, the abnormal return is positive from $t = 1:3$ but only $AR [2] = 1.7\%$ is statistically significant at 10%, the cumulative abnormal return is only statistically significant at date $t = (0; 3]$ with $CAR (0; 3] = 3.8\%$. However, the abnormal returns quickly adjusted downwards on the 4th and 5th day after the event date when $AR [4] = -2.9\%$ and $AR [5] = -3.3\%$, both less than zero and have 1% statistical significance.

After recording many cases of COVID-19 infection in the community in many provinces, on March 30, 2020, the Prime Minister of Vietnam announced the nationwide epidemic of COVID-19, and the next day the economic lockdown was announced. Abnormal return ($AR [-2]$) and cumulative abnormal return ($CAR [-3; 0]$; $CAR [-2; 0]$) are statistically significant showing that investors have predicted trends of measures to limit disease transmission before the date this information is published. They reacted negatively before the event date when the value of $AR [-2] = -3\%$, $CAR [-3; 0] = -3.7\%$; $CAR [-2; 0] = -3.5\%$ are both less than zero. However, oil and gas stock price reversed to increase after the announcement date, abnormal return $AR [2] = 1.7\%$ and cumulative abnormal return $CAR (0; 3] = 3.8\%$ are both greater than zero. This result is different from the studies of Alam et al. (2020); Mazur et al. (2020) Polemis and Soursoou (2020); Yamini (2020). It can be explained by the psychological factor that influenced investors' decisions. Because the 6th adjustment of gasoline prices in 2020 in Vietnam has recorded the lowest selling price of this commodity in the last 11 years (Hung, 2020), along with the rumour that the petrol stations will be closed when the economy lockdown to fight COVID-19, which prompted many local people to focus on buying and storing petroleum. This information was mentioned continuously by the media in the last days of March and early April, affecting investor sentiment and maybe they think that petroleum importers to Vietnam will benefit from this discount. As a result, they focus on buying oil and gas stocks and driving up the stock price three days after the event was announced. However, this sentiment did not last long when the Vietnamese authorities explained to the people and widely publicized in the media the nature of the end of March 2020 gasoline price adjustment. As a result, the abnormal return of oil and gas stocks turned back to decrease on day $t = 4$ and $t = 5$.

5. Conclusion and Recommendation

This article examines how the COVID-19 pandemic affects the stock price of the Oil and Gas industry in Vietnam using event analysis techniques. The three facts studied are: (i) The first patient tested positive for COVID-19 was recorded on January 23, 2020; (ii) The second wave of COVID-19 infection in the community started on March 6, 2020; (iii) Vietnam announced the epidemic of COVID-19 throughout the territory on March 30, 2020. The window $[-5; 5]$ is used to study each event. The results show that after the event date, AR of the event (i) changes sign from negative to positive, AR of the event (ii) is all negative, AR of the event (iii) changes sign from positive to negative. It implied mixed psychology of investors towards events (i) and (iii). Cumulative abnormal return CAR after the event date (i) and (ii) is both negative, in contrast, event (iii) has statistical significance of 5% at $CAR (0; 3] = 3.8\%$ and is positive. This result supports behavioral finance theory. Focused on how psychological influences can affect market outcomes. Behavioral finance can be analyzed to understand different outcomes across a variety of sectors and industries. Behavioral finance asserts that rather than being rational and calculating, people often make financial decisions based on emotions and cognitive biases. The response of Oil and Gas industry's stock price to the event (iii) is completely different from the other two events. This can be explained by the positive sentiment of investors before the news of petrol pumps being shut down due to the COVID-19 pandemic (after which when many people focused on buying and hoarding gasoline when the retail price reached its lowest level in 11 years in Vietnam). Information about the event (iii) implies that anomalous events and flows by information can influence investors' decisions.

The oil and gas industry is experiencing its major decline, and this time it is different. The current context combines a supply shock with an unprecedented demand drop and the COVID-19 crisis. However, the reaction of the Oil and Gas industry's stock price was not quite the same as related to the movement of COVID-19 in Vietnam. Therefore, to limit the risks from investing, investors should update the business performance of enterprises in combination with analysis of both macro and psychological factors before making decisions.

During a period of a sharp decline in oil prices, it will be a favorable condition for Vietnamese oil and gas companies in the upstream segment to negotiate with partners in oil and gas exploitation. They may buyback companies that have the potential but have difficulty being able to exploit them effectively in the long term as the economy recovers.

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