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COVID-19 and the Stock Market Crash: Evidence from Indonesia

N. Nurcahyono, D. Purwanto
Universitas Muhammadiyah Semarang, Semarang, Indonesia

ABSTRACT

The **purpose** of the study is to determine the impact of the COVID-19 pandemic on the market response, measured by abnormal returns, cumulative abnormal returns and average abnormal returns. The authors use OLS events and regression analysis **methods** to measure market response at three-time intervals: in the beginning of COVID-19, during the onset of Delta and Omicron viruses. OLS is used to measure the capital market reaction in the window (–10, +10) for each industry index. The results of the study show that investors reacted very sharply to the onset of COVID-19, which caused high volatility in the market. Most abnormal returns after the pandemic announcement reacted negatively. Only three sectors — consumer, infrastructure and trade — were in the safe zone. At the same time, the spread periods of Delta and Omicron viruses are characterized by slight differences in the average abnormal yield after the announcement. The results of a study in three time frames concluded that the market response was significant only to five-day (0, +5) ads based on AAR and CAAR.

Keywords: COVID-19; market reaction; event study; abnormal return; cumulative abnormal return

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ОРИГИНАЛЬНАЯ СТАТЬЯ

COVID-19 и крах фондового рынка: данные по Индонезии

Н. Нуркахионо, Д. Пурванто
Университет Мухаммадия Семаранг, Семаранг, Индонезия

АННОТАЦИЯ

Цель исследования — определить влияние пандемии COVID-19 на реакцию рынка, измеряемую с помощью аномальной доходности, кумулятивной аномальной доходности, средней аномальной доходности и средней кумулятивной аномальной доходности. Авторы используют **методы** исследования событий и анализа с помощью регрессии OLS для измерения реакции рынка в трех временных интервалах: в начале COVID-19, в период появления вирусов Delta и Omicron. OLS используется для измерения реакции рынка капитала в окне (–10, +10) для каждого отраслевого индекса. Результаты исследования показывают, что инвесторы очень остро отреагировали на начало COVID-19, что вызвало высокую волатильность рынка. Большинство аномальных доходностей после объявления о пандемии отреагировали негативно. Только три сектора — потребительский, инфраструктурный и торговый — оказались в безопасной зоне. При этом периоды распространения вирусов Delta и Omicron характеризуются незначительными различиями в средней аномальной доходности после объявления. По результатам исследования, полученным в трех временных окнах, сделан **вывод**, что реакция рынка является значимой только на объявления за пять дней (0, +5) на основе AAR и CAAR.

Ключевые слова: COVID-19; реакция рынка; исследование событий; аномальная доходность; кумулятивная аномальная доходность

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INTRODUCTION

This study investigated the response of investors when the COVID-19 pandemic occurred over the past two years with three COVID observation times. It was recorded that during the pandemic, there were three waves of COVID-19, namely at the beginning, the government announced that COVID-19 had entered Indonesia, followed by the Delta variant and the Omicron variant. The pandemic significantly impacted the capital market, as evidenced by the decline in the Jakarta Composite Index (JCI) by around ± 62% from the 6,300 area to the 3,900 area [1].[1] The significant decrease in the JCI was influenced by the psychology of investors who wanted to secure their funds so as not to experience more enormous losses, so they tended to save in cash during times of uncertainty. During the pandemic, many investors were competing to get out of the market quickly, causing panic selling. This investor reaction caused very high capital market volatility when viewed through daily, weekly, and quarterly transactions during 2020 and 2021 [2, 3].

Capital market conditions reflect Indonesia's economic conditions during the pandemic, Indonesia's average economic growth before the pandemic was 5%, but during the 2020 pandemic, economic growth was −2.07% and 3.69% in 2021.[2] The decline in economic growth was caused by restrictions on the activities of people and goods, which resulted in all activities being hampered and even several sectors having to be stopped. This activity limitation is based on government policy in the form of limiting community activities. The procedure is in the form of restrictions on social and economic activities, including office activities. 100% work from home, temporarily closed shopping centers and malls, 100% online learning activities, essential sectors (banks, capital markets, export-import, information technology and hotels) 50% with strict health protocols, and critical sectors (energy, health, security, logistics and transportation, food industry) 100% work from the office with strict health protocols. These policies seek to reduce the risk of the virus spreading but have a substantial economic impact.

The economic impact that has the potential to occur as a result of the COVID-19 policy is a recession [4, 5]. The study [4, 6], stated that commodity and financial asset prices fell significantly during the pandemic, with a loss of 12.35%, or 9 trillion dollars worldwide. The United Nations Development Programme [7] revealed the potential for tourists lost during the pandemic to be in the range of $ 850 million to $ 1.1 billion, directly impacting the tourism, transportation and hotel industries. The International Labour Organization (ILO) reports that over the last two years, the number of unemployed in the formal and informal sectors has continued to increase worldwide. It can be concluded that COVID-19 has had a very destructive impact on the global economy.[3] A study [4, 8] found that the most significant impact of the pandemic was on the financial sector, including the stock market, because of investor sentiment towards government policies, causing high market volatility.

Investors' panic selling causes high volatility because the stock market trend continues to decline, so investors feel pessimistic [9]. A study [10, 11] found that investor sentiment influences stock market behaviour, and high volatility directly impacts stock prices and the expected rate of return. The study by [12] reported high, and even unprecedented capital market volatility due to a prolonged pandemic and no drugs have been used to reduce the impact of the spread of the virus. In Indonesia, the condition of the capital market has significantly fluctuated due to various policies from the government, such as control measures and stimulus plans.

Based on the Efficient Market Hypothesis (EMH), all relevant information on the capital market is reflected in stock prices when traded, which encourages investors to overreact. Financial behaviour argues that investors are not always rational and may overreact and lack information, causing psychological bias [3, 13]. Therefore, it is challenging to predict whether the increase in COVID-19 cases is driving the market to overreact and whether it is consistent with the EMH. So we conducted an event study to identify investor responses during a pandemic, divided into three observations. The first observation was made at the start of the COVID-19 pandemic, announced by the government around 2 March 2020. The second observation was made when the government announced the Delta variant in July 2021, and the third observation

[1] Aldin I. U. Volatilitas Tinggi selama Pandemi, IHSG Anjlok 22% selama Semester I. Katadata. 2022. URL: https://katadata.co.id/finansial/bursa/5efbfe0510ea7/volatilitas-tinggi-selama-pandemi-ihsg-anjlok-22-selama-semester-i (accessed on 20.08.2022).

[2] Ekonomi Indonesia 2020 Turun sebesar 2,07 Persen (c-to-c). Badan Pusat Statistik Indonesia. 2021. URL: https://www.bps.go.id/id/pressrelease/2021/02/05/1811/ekonomi-indonesia-2020-turun-sebesar-2–07-persen%E 2%80%93c-to-c-.html (accessed on 20.08.2022).

[3] ILO monitor: COVID-19 and the world of work. Fifth edition. Updated estimates and analysis. Geneva: International Labour Organization; 2020. 22 p. URL: https://www.ilo.org/sites/default/files/wcmsp5/groups/public/@dgreports/@dcomm/documents/briefingnote/wcms_749399.pdf (accessed on 20.08.2022).

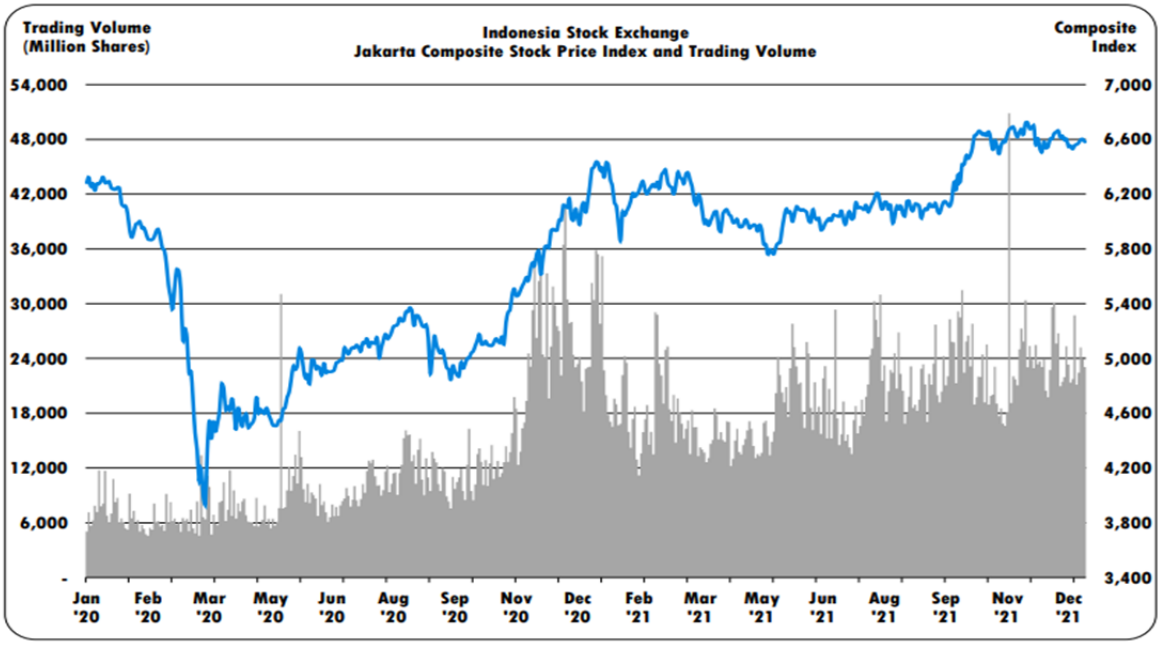

Fig. 1. **Jakarta Composite Index from 2020 to 2021**

Source: IDX Statistics 2021. URL: https://www.idx.co.id/id/data-pasar/laporan-statistik/statistik/ or https://drive.google.com/file/d/1Cgk004vrIBqDgYmizCLMzSFPk4vSU_4g/view?usp=share_link (accessed on 20.08.2022).

was made when the government announced the Omicron variant in February 2022.

Fig. 1 shows the negative response of the capital market as shown by the decline in the JCI, especially from March to May 2020. The decline in the JCI indicates a decrease in aggregate stock prices, which will affect the performance of the capital market as a whole [1]. Capital market performance is influenced by the sectoral performance of companies [10]. Sectoral performance can be measured using the price-to-book value (PBV) and price-to-earnings ratio (PER). PBV describes the company's stock market capitalization compared to its book value [14]. During the observation period, the average sectoral PBV value was 0.79, and the PER value was 0.25.

Based on this phenomenon, we investigated how the capital market reacted during COVID-19. We use an event study with an event window of (–10, +10). When the government announces COVID-19, we find a negative cumulative abnormal return. We elaborated on the black swan theory in measuring the market reaction due to COVID-19. This theory reveals that COVID-19 is a "black swan" event because it is unprecedented, challenging to predict, has a significant impact and is beyond ordinary estimates [15].

Many researchers from various countries have researched the capital market reaction due to COVID-19. In a study of the impact of stock market returns on COVID-19 announcements by the government [16–19], their findings show that the capital market reacts quickly, which results in high volatility accompanied by a decrease in stock prices, thereby significantly reducing market returns. The study [1] discusses stock returns with an increase in COVID-19 cases in Indonesia, found a decrease in market returns represented by the JCI at its lowest point due to an increase in the number of people infected with COVID-19 and the high death rate from the virus. Furthermore, Study [20–23] conducted a study on the impact of the lockdown policy implemented by the country on stock returns. Their study describes that the lockdown policy caused the industry to reduce or stop its business operations, thus significantly reducing the level of profitability, and not a few companies experienced financial distress during the COVID-19 period; therefore, it will result in returns in the form of dividends and capital gains. Then the study linked capital market reactions to the unique cultural effects of each country [24–26]. The culture of each country influences policies in efforts to mitigate COVID-19 and will have a significant effect on the capital market. Based on the findings of previous studies, the capital market reaction to the announcement of COVID-19 was measured by changes in abnormal returns.

Our study differs from most previous studies, which assessed the capital market's reaction to the first announcement of COVID-19. The study we conducted evaluated the capital market's response during COVID-19 with three observations, namely at the time of the information of COVID-19, the Delta variant and the Omicron variant [20, 27]. This study

is critical because it looks at the market reaction in the first, second and third waves of COVID-19 in Indonesia and the financial behaviour of investors in each observation. Other researchers have not done this. Comparisons between COVID-19 variants can be used to assess investors' decisions on each adherence so that they can map their behaviour to the development of COVID-19.

Our research has several contributions. First, it will provide empirical evidence regarding the efficiency of the Indonesian stock market by calculating the average abnormal return on non-economic events in Indonesia and the world. Second, the results of this study add to the financial behaviour literature by showing investors' negative responses and sentiments in making investment decisions during the second wave of COVID-19. Third, high Average Abnormal Return (AAR) and Cumulative Abnormal Return (CAAR) represent companies with stable cash flow, making it feasible to invest in various conditions. In the COVID-19 condition, we found three industries with positive abnormal returns in the three COVID-19 periods: the CONSUMER, INFRASTRUC and TRADE sectors.

Hypotesis Development

COVID-19 has had a significant impact on the economy, this is reflected in the condition of a country's capital market. The capital market is considered the most relevant instrument for predicting actual economic activity in a country. Stock prices reflect real activity expectations and equity value changes, resulting in prospects for a country's economic activity declining due to uncertainty due to an unprecedented pandemic [19]. COVID-19 can also be called the black swan event, which is characterized by a huge impact that is difficult to predict and does not know when it will end [28]. The significant impact caused by the COVID-19 pandemic is a global economic recession. The IMF revealed that the economic downturn during the COVID-19 pandemic was the worst compared to the economic slowdown in 2008 [25]. This is evidenced by the economic downturn in 2008, which resulted in a 0.1% decrease in global Gross Domestic Product (GDP) in 2009. Still, the economic downturn due to COVID-19 reduced 3% of global GDP to "great lockdown". Specifically, during the COVID-19 pandemic, the Indonesian economy experienced negative growth of minus 2.6%.

The global economic recession has had a significant impact on the capital market. A study [19] revealed that the result of the lockdown carried out in Italy had an influence on GDP and dividend policy, which had downward trend, as well as the US and Europe, which had a growth under the 2008 global crisis. A study [7] analyzed the behaviour of the capital market during the COVID-19 pandemic compared to the outbreaks of Avian Flu, SARS, Swine Flu (H1N 1), Ebola and MERS. His analysis shows that COVID-19 is the outbreak episode that has most affected the capital market. Ashraf [2] also found that the COVID-19 outbreak caused unprecedented volatility in the capital market. The study [6] found a substantial increase in global financial market volatility according to the severity of each country. The higher the number of COVID-19 cases in a country, the higher the capital market volatility.

The high volatility of the capital market illustrates the occurrence of a significant decline or increase in stock prices, thereby affecting the stability of the capital market. Volatility can also be understood as a market mood. During the COVID-19 pandemic [23] argued that volatility tends to lead to a rapid and significant decline in stock prices, so investors will psychologically panic sell, profit take, and look for safer assets during a crisis. Investor decisions during a pandemic are inseparable from the effect of sentiment on the capital market, which continues to decline and triggers a feeling of pessimism so that they will seek investments that tend to be safer.

This study analyzed the overall response of investors at the start of the COVID-19 pandemic, the announcement of the Delta variant and the Omicron variant. It is hoped that this research can add scientific references regarding the capital market's response during the COVID-19 pandemic by using event studies. This research can also provide investors with information on recognizing the behavior of the capital market in Indonesia during a pandemic so that they can make the best investment decisions.

The hypothesis to be tested is whether there are differences in average abnormal returns (AAR) and cumulative abnormal returns (CAAR) in companies before and after the announcement of the COVID-19 pandemic and its various variants.

H1: There are differences in abnormal returns before and after the announcement of COVID-19, Delta and Omicron.

H2: There is a significant positive AAR around the date of the event, and it is significantly greater than zero, i.e. $1/n.\Sigma AR \geq 0$ at the start of COVID-19, Delta and Omicron.

RESEARCH METHOD

The research method used is an event study to determine the impact of COVID-19 on the capital market's reaction. This method is used to assess the effect of the announcement of COVID-19 for

the first time in Indonesia and the information on the COVID-19 variants of the Delta and Omicron capital market reactions individually, sectorally and in aggregate. This method also makes it possible to assess investors' responses to the COVID-19 event [29]. The advantage of using this technique is that it can be used from time to time and can carry out analysis of successive events so that it can be used to continuously assess the stock market response [26]. According to [30], the event study method has very high reliability to help assess the impact of "abnormal" stock prices due to market and business changes due to COVID-19 and government policies.

The first thing that must be determined with this method is to select events that significantly influence market reactions. Events are defined in three windows. The first window was chosen on 2 March 2020, the first time the government announced COVID-19 in Indonesia. The selected second window is 20 July 2021, when the COVID-19 Delta variant appears. The third window set is 20 February 2022, at the start of the emergence of the Omicron variant in Indonesia. The observation period chosen is 21 trading days, with 10 days before and 10 days after the event (–10, +10). The 21-day observation period refers to research [31].

Comparison of capital market reactions to sectoral indices using Abnormal Return (ABR) and Cumulative Abnormal Return (CAR). Then the aggregate investors' reaction is calculated from the movement of the average stock in the capital market so that it uses the Average Abnormal Return (AAR) and Average Cumulative Abnormal Return (CAR) instruments. We use ordinary least squares (OLS) to analyze every change in each event window in the three observation periods.

The regression model is presented below:

$$R_{it} = \frac{Pi,t - Pi,t-1}{Pi,t-1}. \quad (1)$$

Equation 1 measures the actual return by comparing the return received at this time to the previous day's return. Actual return calculation by comparing today's closing price with the previous one.

$$Rm_t = \frac{\sum_{t=-10}^{+10} Ri,t}{21}. \quad (2)$$

Equation 2 is used to calculate the expected return by investors. This return is measured using sectoral indices and market models based on stock price fluctuations in each sector.

$$Ar_{i,t} = R_{it} - Rm_t. \quad (3)$$

Equation 3 is used to calculate sectoral abnormal returns. Abnormal return is calculated by subtracting the actual return from the expected return. Rit is the sectoral average return on day *t*. Rmt is the average return index over the range of events (–10, +10).

Next, we compare the abnormal return through the mean-adjusted return value to the market value to measure the capital market's reaction [32] to the sectoral index on the COVID-19 event. The equation for calculating market reaction is shown in equation 4.

$$AMR_{i,t} = R_{i,t} - (A_{i,t} + \beta_{i,t} Rm_t), \quad (4)$$

where Rm_t is the IHSG return, A_{it} and β_{it} are OLS regression coefficients at the estimation window (–10, +10). Equation 4 is used to test the hypothesis of whether there is a difference in abnormal returns before and after the event.

Then the aggregate reaction of investors is measured using the Average Abnormal Return (*AAR*) and Average Cumulative Abnormal Return (*CAAR*).

$$AAR_t = \frac{\sum_{t-1}^{k} ARi,t}{N}, \quad (5)$$

$$CAR = \sum_{t-1}^{n} ARi,t, \quad (6)$$

$$CAAR_t = \frac{\sum_{i=1} CARi,t}{N}, \quad (7)$$

where AAR_t — average abnormal return; $AR_{i,t}$ — abnormal return of stock-*i* on *t* period; *N* — total security affected by the event; *CAR* — comulative abnormal return; C*AAR* — cumulative average abnormal return security from the beginning of event period.

RESULT AND DISCUSSION

This study's results explain investors' reactions during the COVID-19 pandemic with the observation period of 2 March 2020, 20 July 2021 and 20 February 2022. Our observations show two different index categorizations. In 2020, companies were categorized into nine sectors and starting in 2021, there will be a change in categorization into 11 industries. Referring to the black swan theory, a COVID-19 pandemic is an unprecedented event and an extreme financial business phenomenon with a huge impact. Based on *Table 1* using CAR before and after the event, the results show a significant difference. At the beginning of COVID-19, the capital market's reaction was seen as indicated by the CAR, which had a negative value,

indicating that the actual return obtained by investors was lower than the expected return. This condition was caused by the decline in aggregate stock prices by sector as a result of investors exiting the capital market [23, 27, 33–35].

The second wave of COVID-19 with the Delta variant shows that the market is active. Psychologically, investors are used to the capital market turmoil of a pandemic. Investors responded sparingly to the second wave of COVID-19 because they already knew the investment pattern during the pandemic and had found ways to secure their assets. Even though investors were not as reactive as during the first wave of COVID-19, there were still significant differences before and after the announcement of the Delta variant. Because the company already knows the mitigation due to the pandemic based on experience in the first wave [36].

In contrast to the second wave, when the government announced a new variant of COVID-19, Omicron, in February, the capital market responded quickly. In this wave, panic selling, like in the first period, caused stock price volatility. This period shows the average difference before and after the announcement of COVID-19, showing a negative abnormal return value, meaning that the company cannot provide income to investors.

The events during the pandemic are very relevant to the black swan theory. The COVID-19 pandemic is included in the rare event category and seldom occurs, so it has a small probability. Then it has a disproportionate and significant impact, which is shown by the economic turmoil in the world [6]. Even according to [12, 15], the pandemic had a more significant impact than the Second World War, especially in the economic field. The study [10, 20, 37] reported that it caused a recession that was worse than the collapse of the glories of Enron, WorldCom, and others. Then this event also cannot be predicted and measured using mathematics, statistics, or any other sophisticated technology. As evidenced by various waves of COVID-19 with multiple variants spread worldwide, Indonesia is no exception. Indonesia's capital stock had experienced a decline of 62%, and macroeconomic growth was almost minus three per cent [17, 38, 39]. Therefore, according to this theory, it is specifically for investors to increase their skepticism about current conditions and choose to place assets that have less risk.

Based on *Table 2*, the AAR value, which describes the average abnormal return index, shows no difference between before and after the announcement of COVID-19. The same thing also happens in the market model, which is represented by the CAAR value indicating the sig value of all windows is greater than 0.05 (not significant). However, specifically at the start of COVID-19, especially five days after the announcement of the pandemic by the Indonesian government, the market responded negatively, as shown in the *AAR* and *CAAR* values for $t + 1$, $t + 2$, $t + 3$, $t + 4$ and $t + 5$, indicating a negative positive response. Unlike the second and third waves with the Delta and Omicron variants, investors were not overly responsive to the announcement of a new virus. This is shown when the market only responds two days before the report.

However, in general, market announcements respond with negative returns for investors. The movement of investors around the announcement date is described in *Fig. 2*, which indicates a decrease in the graph around the announcement date. The COVID-19 announcement contained information that caused investors to lower their expectations of investment prospects in the capital market, resulting in a negative response from the market [18, 22]. The pandemic announcement caused high market volatility, which led to a significant decrease in stock returns. Based on investor behavior, usually, they will only respond to a market event around the announcement date, the rest will have no effect [35].

Investors had different responses to the three waves of COVID-19, which can be explained in *Fig. 3*. Based on the AAR, investors were very reactive to the market at the start of the pandemic. Still, the announcement of the delta and omicron variants did not cause an excessive response. It's the same with CAAR, where the chart shows that only at the start of COVID-19 did it produce an intense trough. Thus, in general, there was a difference between investor reactions at the beginning of the COVID-19 pandemic in March 2020, the delta variants in July 2021 and February 2022, and there was no difference in investor response during Delta and Omicron. Based on the psychological theory [21], a person will only tend to respond with panic at the first event occurring but will not react too much if there is a repeated event [23, 26]. Because someone has prepared mitigation and carried out careful calculations according to it, this is often referred to as "don't fall into the same hole".

Based on the empirical results of AAR and CAAR, three sectors have positive abnormal returns, namely the CONSUMER, INFRASTRUC and TRADE industries. These results indicate that they can maintain performance and stabilize cash flows under high environmental uncertainty. The CONSUMER industry is an essential industry that produces basic human needs, so it has little impact. The INFRASTRUC industry in Indonesia is divided into energy, telecommunications, transportation and nonbuilding construction, which are vital industries. The government has issued particular policies so these industries can continue operating

Table 1

Mean Equality Test for Cumulative Abnormal Return (CAR)

BEGINNING COVID-19					
Event Window	**Sector**	**Before (%)**	**After (%)**	**After–Before (%)**	**Sig**
H – 10, H + 10	AGRI	0.204	–0.581	–0.377	0.004
	BASIC–IND	0.765	–0.002	0.767	0.011
	CONSUMER	0.838	0.713	–0.125	0.017
	FINANCE	0.069	–0.413	–0.344	0.011
	INFRASTRUC	0.172	0.247	0.075	0.009
	MINING	0.746	–0.212	–0.958	0.022
	MISC–IND	–0.109	–0.921	–0.812	0.020
	PROPERTY	0.577	–0.069	0.508	0.029
	TRADE	0.434	0.031	–0.403	0.045
COVID-19 DELTA					
Event Window	**Sector**	**Before (%)**	**After (%)**	**After–Before (%)**	**Sig**
H – 10, H + 10	IDXBASIC	–0.005	0.008	0.013	0.018
	IDXCYCLIC	–0.099	0.412	0.511	0.028
	IDXENERGY	0.016	0.168	0.152	0.000
	IDX FINANCE	0.300	0.069	–0.231	0.014
	IDXHEALTH	0.607	–0.726	–1.333	0.037
	IDXINDUST	–0.332	0.065	0.397	0.004
	IDXINFRA	0.098	0.288	0.190	0.000
	IDXNONCYC	–0.268	–0.670	–0.402	0.030
	IDXPROPERT	–0.029	0.116	0.145	0.008
	IDXTECHNO	0.061	0.640	0.579	0.043
	IDXTRANS	0.285	0.279	–0.006	0.037
	COMPOSITE	0.084	0.190	0.106	0.023
COVID-19 OMICRON					
Event Window	Sector	Before (%)	After (%)	After–Before (%)	Sig
H – 10, H + 10	IDXBASIC	–0.098	0.064	–0.034	0.023
	IDXCYCLIC	0.27	–0.694	–0.424	0.039
	IDXENERGY	–0.129	0.055	–0.074	0.048
	IDX FINANCE	0.035	–0.225	–0.19	0.046
	IDXHEALTH	0.655	–0.146	0.509	0.023
	IDXINDUST	0.09	0.503	0.593	0.029
	IDXINFRA	0.393	0.148	0.541	0.000
	IDXNONCYC	–0.107	–0.552	–0.659	0.025
	IDXPROPERT	–0.156	–0.236	–0.392	0.014
	IDXTECHNO	–0.475	–0.283	–0.758	0.047
	IDXTRANS	0.215	–0.917	–0.702	0.010
	COMPOSITE	0.171	–0.112	0.059	0.022

Source: Compiled by the authors.

Table 2

Daily Capital Market Response during Events with T-Test

Event Window	Beginning COVID		Sig	Delta		Sig	Omicron		Sig
	AAR	CAAR		AAR	CAAR		AAR	CAAR	
t – 10	0.708	0.708	0.200*	0.403	0.403	0.204	–0.351	–0.351	0.307
t – 9	–0.112	0.596	0.148	0.465	0.868	0.261	–0.309	–0.660	0.233
t – 8	–0.253	0.342	0.200*	0.109	0.977	0.794	–0.103	–0.763	0.539
t – 7	0.040	0.382	0.200*	–0.131	0.846	0.840	0.068	–0.695	0.476
t – 6	0.213	0.596	0.200*	0.215	1.061	0.483	0.155	–0.540	0.459
t – 5	0.172	0.423	0.200*	–0.595	0.465	0.977	0.011	–0.529	0.233
t – 4	0.488	–0.064	0.200*	–0.041	0.425	0.163	–0.307	–0.836	0.893
t – 3	0.528	–0.592	0.200*	0.208	0.633	0.810	0.088	–0.748	0.570
t – 2	0.088	–0.680	0.200*	–0.285	0.348	0.454	0.119	–0.629	0.246
t – 1	0.733	–1.413	0.200*	–0.044	0.305	0.967	0.012	–0.617	0.814
t 0									
t + 1	–0.577	–0.732	0.200*	–0.236	–0.236	0.270	–0.335	–0.335	0.469
t + 2	–0.238	–0.494	0.200*	–0.165	–0.401	0.923	0.024	–0.311	0.656
t + 3	–0.497	–0.002	0.192	0.467	0.066	0.435	–0.205	–0.516	0.218
t + 4	–0.239	–0.241	0.119	0.187	0.254	0.873	–0.090	–0.606	0.654
t + 5	–0.523	0.764	0.200*	0.129	0.383	0.538	–0.228	–0.835	0.600
t + 6	0.261	1.026	0.193	–0.126	0.256	0.608	–0.191	–1.025	0.485
t + 7	–1.511	–0.486	0.200*	0.072	0.328	0.720	0.145	–0.880	0.831
t + 8	–0.047	–0.532	0.200*	0.390	0.718	0.897	–0.091	–0.971	0.247
t + 9	–0.101	–0.633	0.100	–0.010	0.708	0.625	0.256	–0.715	0.972
t + 10	0.1067	–0.5267	0.065	–0.170	0.538	0.623	–0.270	–0.985	0.443

Source: Compiled by the authors.

normally. Likewise with the TRADE industry, during COVID-19, the government limited people's mobility but not goods' mobility so that the industry was not so affected by COVID-19.

CONCLUSION

Based on an analysis of the capital market during the pandemic, we found differences in investor reactions at the start of COVID-19 and the delta and omicron variants. At the beginning of COVID-19, investors were very responsive, especially wanting to get out of the capital market immediately, so panic selling caused a decline in stock prices, resulting in negative abnormal returns. In contrast to the delta and omicron phases, the investor response is not too large. Differences in sectoral index abnormal returns occurred in almost all sectors except for the CONSUMER, INFRASTRUC and TRADE sectors, which still gave positive abnormal returns after the first announcement of COVID-19. Still, there were no significant differences in the delta and omicron abnormal returns.

In addition to assessing the rate of return on the capital market using abnormal returns, we also identify the market response around the day of the announcement of COVID-19 in these three windows. Using AAR and CAAR. At the beginning of COVID-19, there was a very sharp decrease, up to 60%, but for Delta and Omicron, the reduction in AAR was still around the standard line. Overall, our research empirically

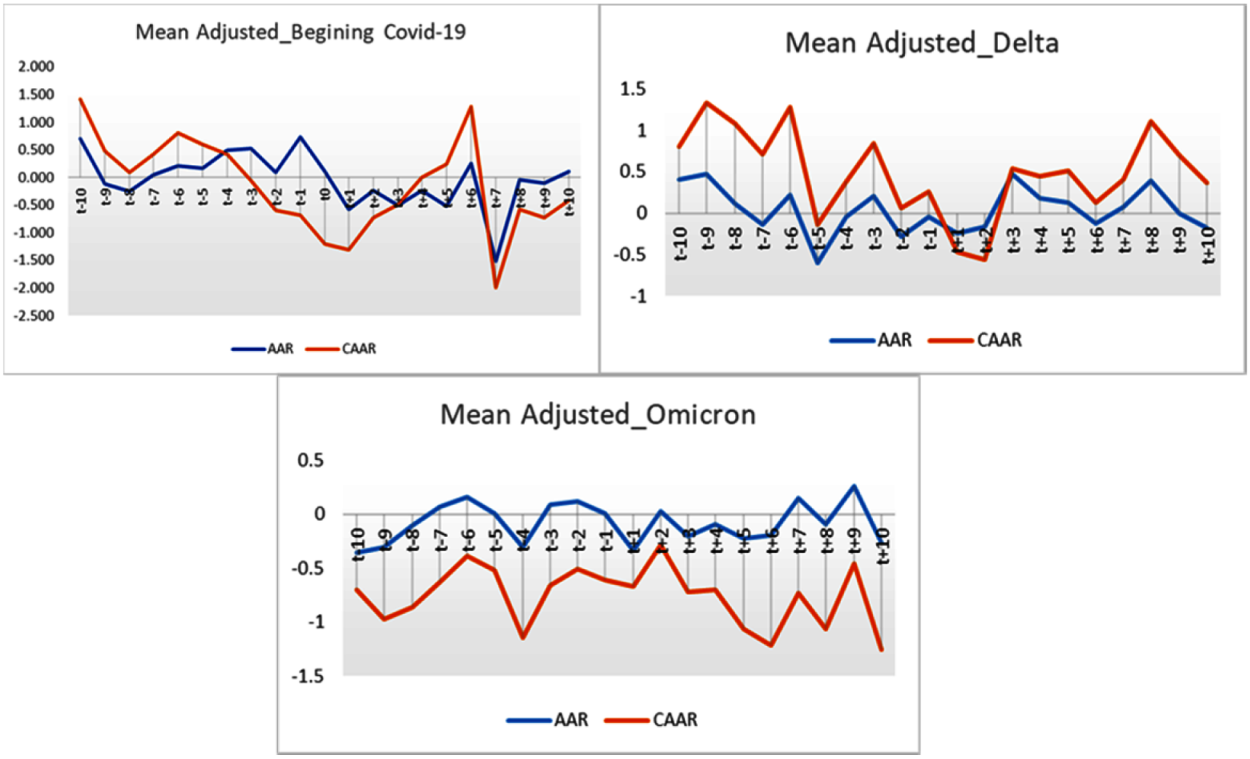

Fig. 2. ***AAR*** **and** ***CAAR*** **in the Three Waves of COVID-19**

Source: Data processed by author.

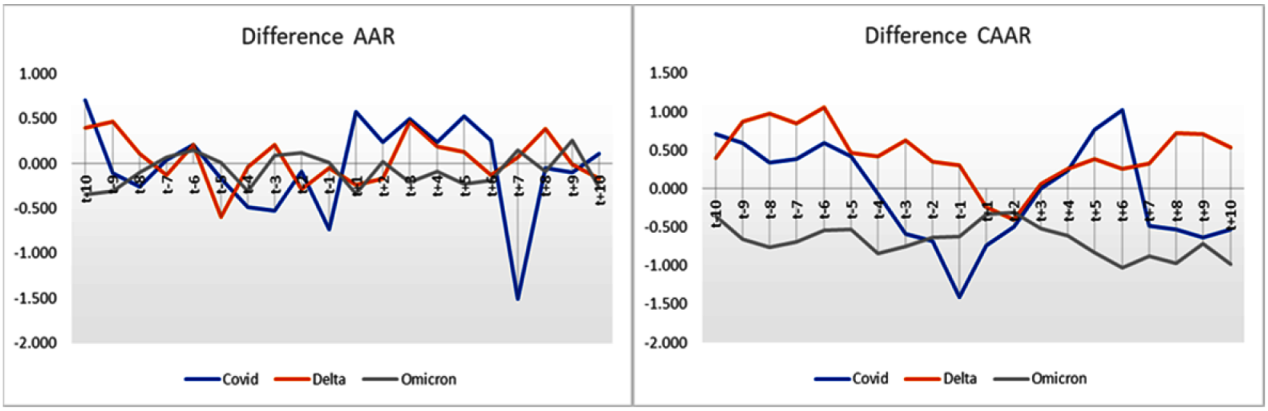

Fig. 3. **Comparison of** ***AAR*** **and** ***CAAR*** **for the Three Waves of COVID-19**

Source: Data processed by author.

provides evidence of the capital market's response during the COVID-19 pandemic, which is analyzed in three directions. So, this research contributes to the development of literature on COVID-19 and market crashes. As well as providing recommendations for investors related to investing in safe sectors and market reactions after the announcement, which generally only lasts five days, it returns to normal.

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ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

Nurcahyono Nurcahyono — Dr. (Cand.), M.S.A, Department of Accounting, Universitas Muhammadiyah Semarang, Indonesia
Нуркахионо Нуркахионо — соискатель PhD, магистр бухгалтерского учета, Университет Мухаммадия Семаранг, Индонезия
https://orcid.org/0000-0001-9152-5205
Corresponding author / Автор для корреспонденции:
nurcahyo@unimus.ac.id

Dedik Purwanto — Dr. (Cand.), M.M., Department of Management, Universitas Muhammadiyah Semarang, Indonesia
Дедик Пурванто — соискатель PhD, магистр, Факультет менеджмента, Университет Мухаммадия Семаранг, Индонезия
https://orcid.org/0000-0001-8502-8341
dedik@unimus.ac.id

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