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| **Resilient finance: Navigating COVID-19 in the Indonesian capital market through an Islamic economic perspective****Puji Sucia Sukmaningrum1\*, Nuradli Ridzwan Shah Bin Mohd Dali2, Muhammad Madyan3, Nisful Laila4, Tika Widiastuti5**1Department of Islamic Economics, Faculty of Economics and Business, Universitas Airlangga, Indonesia2Faculty of Economics and Muamala, Universiti Sains Islam Malaysia, Malaysia |
| **Article Info** |  | **Abstract** |
| ***Paper type:*** *Research Paper*  |  | *This study examines investor behavior, measured by trading volume activity (TVA) and average abnormal return (AAR), during the COVID-19 pandemic in Indonesia. It provides a comprehensive analysis of the pandemic's impact on four key subsectors: pharmaceuticals, telecommunications, transportation, and food and beverages. Using an event study methodology with daily stock prices and trading volume data, the results reveal varying investor reactions across subsectors. Notably, the pharmaceutical subsector showed significant differences in TVA averages and AAR changes two days before and seven days after the pandemic announcement. In contrast, the food and beverages subsector experienced no significant change in TVA, but notable AAR fluctuations over 11 days. The telecommunications subsector demonstrated significant negative AAR differences post-announcement, despite no TVA changes, while the transportation subsector experienced a negative AAR difference over 11 days with no TVA variations. This detailed sectoral analysis offers valuable insights for stakeholders seeking to understand the differential impact of COVID-19 on various industries.* |
| **Keywords:***Financial empowerment; Event study; Covid-19; Stock price; Investor behavior; Abnormal return* |  |
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**Introduction**

Currently, the world has been suffering from the COVID-19 pandemic. WHO first identified the case on December 31, 2019, in Wuhan, the People's Republic of China ([WHO, 2020](#WHO2020)). Supported by the ease of human movement and coinciding with the Chinese New Year, the virus spread rapidly worldwide. Furthermore, WHO announced the global pandemic on March 11, 2020, which hit more than 100 countries around the globe ([Roxby, 2020](#Roxby2020)). At the end of 2020, there were more than 83 million positive cases of COVID-19 and more than 1.9 million deaths caused by the Covid-19 virus ([Worldometer, 2021](#Worldometer2021)). Covid-19 has harmed the global economy. The International Monetary Fund projects global economic growth of minus 4.9% in 2020 ([IMF, 2020](#IMF2020)). The outbreak of the COVID-19 virus has also had an impact on the decline in global stock markets. According to the Dow Jones report, the most significant one-day loss was nearly 3000 points on March 16, 2020. The economic losses from the COVID-19 outbreak were primarily driven by falling demand. For example, performance shock occurs in the travel and tourism industry because most countries restrict travel, undoubtedly impacting related sectors ([Szmigiera, 2021](#Szmigiera2021)).

On March 2, 2020, President Joko Widodo announced two Indonesians had been infected with COVID-19 ([Ihsanudin, 2020](#Ihsanudin2020)). By far, the spread of the Covid-19 virus in Indonesia has not shown a significant decline. In Indonesia, positive COVID-19 cases as of the end of December 2020 reached more than 740,000 cases, and more than 22,000 people died due to COVID-19 ([Covid-19 Task Force Site, 2020](#Situs2020)). The COVID-19 outbreak affected the Indonesian economy, causing a contraction in the first quarter of 2020 economic growth of -2.41% compared to the fourth quarter of 2019 ([BPS, 2020](#BPS2020)). In addition, the Covid-19 outbreak impacted declining stock values in the Indonesian capital market. The JCI experienced a decline of more than 5%. There were policies such as temporary suspension and changes to the auto-rejection limit to reduce pressure on the market ([Selasi, 2020](#Selasi2020)).

COVID-19 also contributes to a significant adverse effect on stock returns in all affected countries and regions. Stock markets in Asian countries reacted more quickly to the outbreak. Confirmed cases of COVID-19 have a significant detrimental effect on the performance of major stock indices, with those in Asia experiencing an even more substantial decline in abnormal returns ([Liu et al., 2020](#Liu2020)). Pandemic disease negatively affects stock market returns from the Hang Seng and Shanghai Stock Exchange Composite Index ([Al-Awadhi et al., 2020](#AlAwadhi2020)). In addition, [Bai et al. (2020)](#Bai2020) found that the pandemic significantly impacted stock market volatility. The different reactions occurred due to other actions by the government in dealing with the pandemic.

The COVID-19 pandemic exemplifies a VUCA environment, where volatility is reflected in the sharp fluctuations of stock markets and economic contractions, uncertainty emerges from the unpredictable spread of the virus and its financial impact, complexity is evident in the interconnected disruptions across industries like healthcare, transportation, and food and beverage, and ambiguity arises from inconsistent government responses and investor behavior ([Hendratmi et al., 2024](#Hendratmi2024)). This volatile and uncertain landscape challenged traditional decision-making, forcing investors, businesses, and policymakers to navigate rapidly changing scenarios with limited information and increasing risks.

The stock market is a macroeconomic barometer, so the impact of an infectious disease pandemic on the economy can directly be reflected in the volatility of stock market prices ([Bai et al., 2020](#Bai2020)). Previous studies have identified several significant events affecting the stock market, for example, disasters ([Kowalewski & Śpiewanowski, 2020](#Kowalewski2020)), sports ([Buhagiar et al., 2018](#Buhagiar2018)), news ([Li, 2018](#Li2018)), environment ([Alsaifi et al., 2020](#Alsaifi2020); [Guo et al., 2020](#Guo2020)) and political events ([Bash & Alsaifi, 2019](#Bash2019); [Shanaev & Ghimire, 2019](#Shanaev2019)). Stock market returns can also react to pandemic illnesses, for example, Severe Acute Respiratory Syndrome (SARS) outbreaks ([C.-D. Chen et al., 2009](#Chen2009); [M.-H. Chen et al., 2007](#Chen2007)) and episodes of Viral Disease Ebola (EVD) ([Ichev & Marinč, 2018](#Ichev2018)). [Wang et al., (2013)](#Wang2013) showed that there was a significant abnormal return on the stocks of biotechnology industry companies in Taiwan during the outbreak of ENTEROVIRUS 71, DENGUE FEVER, SARS, and H1N1. [Anh & Gan (2020)](#Anh2020)examined the effect of the COVID-19 pandemic and lockdown on daily stock returns in Vietnam and found that the pre-lockdown COVID-19 had a negative impact, while the lockdown period had a positive effect on the stock performance of all markets and different business sectors in Vietnam. Likewise, [Narayan et al. (2020)](#Narayan2020) found that the lockdown policy positively impacted the stock market. However, these findings contradict [Baig et al. (2020)](#Baig2020) and [Eleftheriou & Patsoulis (2020)](#Eleftheriou2020) indicate a negative effect of the lockdown on the US and international stock markets.

Previous studies generally examine the impact of COVID-19 on the capital markets. However, this study takes a more specific approach by analyzing the effects on individual subsectors. The subsectors selected for this research are those whose business activities align with Sharia principles and have been significantly influenced by the COVID-19 pandemic. Therefore, this study tries to examine the effect of the pandemic by investigating investors' behavior and market reactions but focuses on sectors directly adjacent to the pandemic, namely the health, telecommunications, transportation, and food and beverage subsectors.

The Indonesia Stock Exchange is the fourth best-performing stock exchange in Southeast Asia and reached the eleventh rank in the Asia Pacific in 2019 ([Aldin, 2019](#Aldin2019)). However, the rating steps back compared to the previous year, which recorded the second-best position in Asia in major stock movements ([Arief, 2018](#Arief2018)). Since the beginning of 2020, stock movements have been on a downward trend (bearish). On the day of the announcement of the first COVID-19 case in Indonesia, the Jakarta Composite Index (JCI) recorded a decrease of 91 points (1.67%). The increasing Number of COVID-19 cases made the JCI fall even more profound. On March 9, 2020, the JCI had decreased by 6.5%. This condition forces regulators to implement a trading stop policy (trading halt) to prevent the decline from deepening. Shortly after WHO announced a global pandemic, trade on March 12, 2020, the JCI experienced a drop of more than 5%. At that time, the JCI corrected by 258 points or 5.01% to the level of 4,895 ([Simorangkir, 2020](#Simorangkir2020)).

 Figure 1. The movement of stock prices around the event

Source: ([IDX, 2020](#IDX2020)), data processing

The Covid-19 can affect investors' behavior in investing. The behavioral theory assumes that excessive market volatility derives from emotions and unstable confidence from investors. Volume trading is a trigger of herding behavior. Volume trading can be a reason for investors to imitate one another. Trading volumes that are too large can increase herding behavior because it allows expert investors to make trades more efficiently based on their information and enables uninformed investors to keep up with them. During periods of uncertainty, investors facing the fear of significant losses may choose to imitate other investors and copy their possibly well-informed strategy, accentuating the increase in trading volume ([Litimi et al., 2016](#Litimi2016)).

This study explored the behavior of investors and the reaction of the stock market in Indonesia in response to the COVID-19 outbreak using the Event Study method. There were four sub-sectors analyzed: the health, telecommunications, transportation, and food and beverages sectors. These sectors are considered the most reactive since they are directly adjacent to the pandemic. Investors have observed changes in share prices since the end of 2019, when the first case occurred in Wuhan. However, this study occupied the official data issued by the Indonesian government when the COVID-19 case was first announced.

This study found a significant difference in TVA averages and a change in AR two days before and seven days after the announcement on the pharmaceutical sub-sector. There was no TVA average, but significant AAR fluctuations occurred in 11 days during the food and beverages sub-sector observation period. Surprisingly, the telecommunications sub-sector experienced significant negative AAR differences after the announcement, although there was no significant difference in TVA. Finally, there is a negative difference in AAR on 11 days during observation in the transportation sub-sector, but there is no difference in TVA. To address the gaps highlighted in previous studies, this research provides a unique contribution by analyzing specific sub-sectors within the Indonesian stock market rather than adopting a country-level approach as commonly conducted in Event Study methods.

The remainder of this paper consists of five sections. Next, the literature review section provides an overview of the concept of the capital market in Indonesia and an event study. The third section includes data sources and analysis techniques. The fourth is the findings and analysis section, which describes the results and analyzes each problem formulation. Then, the last section discusses conclusions.

**Literature Review**

*Islamic economy*

Islamic economics is a system based on Sharia (Islamic law), aiming to achieve socio-economic justice by incorporating ethical principles and prohibiting activities considered harmful, such as riba (usury), gharar (excessive uncertainty), and maysir (gambling). Unlike conventional economic systems, Islamic economics emphasizes equity, social justice, and the alignment of economic activities with Islamic moral teachings ([Chapra, 1992](#Litimi2016)). Islamic finance, a practical extension of Islamic economics, facilitates financial transactions while ensuring compliance with Sharia. This system is built on risk-sharing and prohibits speculative activities, offering alternatives such as mudarabah (profit-sharing), musharakah (joint ventures), and ijarah (leasing) ([Iqbal & Mirakhor, 2011](#Litimi2016)). These instruments promote fairness and shared responsibility among stakeholders, aligning financial goals with ethical principles.

The growth of Islamic finance globally has been substantial, with assets under management surpassing $2 trillion, indicating a rising demand for Sharia-compliant financial products ([IFSB, 2021](#Litimi2016)). Countries like Malaysia, Saudi Arabia, and Indonesia have established robust frameworks to support the Islamic finance sector, contributing to its growth and integration into the global economy ([Baaquie, 2020](#Baaquie2020))Key challenges include the lack of standardization in Sharia-compliant financial instruments, limited public awareness, and the need for capacity-building in human resources within Islamic finance. Addressing these challenges requires collaborative efforts among regulatory bodies, financial institutions, and scholars to ensure sustainable growth and wider acceptance of Islamic economic principles. ([Faozan, 2013](#Faozan2013))

*Investment in Islamic perspective*

Islamic investment, or shariah-compliant investment, is grounded in Islamic principles, focusing on ethical financial practices alongside profitability. Key principles include the prohibition of riba (interest), which is seen as exploitative; *gharar* (uncertainty), which ensures transparency in transactions; and *maysir* (gambling), which avoids speculative investments. Investments should be based on real, tangible assets rather than speculative or harmful activities, adhering to what is *halal* (permissible) and avoiding *haram* (forbidden) industries like alcohol and gambling.

In Indonesia, the Shariah capital market is regulated by the National Shariah Board (DSN-MUI), which ensures that financial instruments like Shariah-compliant stocks, Sukuk (Islamic bonds), and Shariah mutual funds meet Islamic standards. These investments undergo qualitative and quantitative screening, such as limiting the debt-to-equity ratio and ensuring non-halal income is minimal ([Habibi et al., 2022](#Habibi2022)). Shariah-compliant investments are considered more efficient and resilient in the long run compared to conventional investments. While there are challenges, including limited awareness, the growth of the Shariah market demonstrates its potential for ethical financial growth. By educating investors about the benefits of shariah-compliant investments and aligning with maqasid shariah (objectives of Islamic law), these investments offer a sustainable and inclusive alternative to traditional financial markets ([Alzahrani, 2019](#Alzahrani2019)).

*Capital market in Indonesia*

The Indonesian capital market is regulated in the Law of the Republic of Indonesia Number 8 of 1995 concerning the capital market. In the Law of the Republic of Indonesia Number 8 of 1995, it is stated that the capital market has a strategic role in national development as a source of financing for the business world and a vehicle for investment for the community. The capital market plays an essential role in the Indonesian economy. The contribution of the capital market to the Indonesian national economy reaches 48-50 percent ([Melani, 2021](#Melani2021)).

*The composite stock price index*

The Composite Stock Price Index also called the Jakarta Composite Index (JCI), is an index that becomes an indicator of stock price movements of all companies listed on the Indonesia Stock Exchange ([IDX, 2019](#IDX2019)). The JCI changes the price daily using the closing price. Stock price changes provide a historical overview of the index movement to measure the stock market's performance.

*Jakarta Stock Industrial Classification (JASICA)*

The Jakarta Stock Industrial Classification (JASICA) system organizes companies listed on the Indonesia Stock Exchange (IDX) into nine main sectors, subdivided into 55 sub-sectors. These sectors, spanning primary, secondary, and tertiary industries, align with Indonesia’s Business Classification (KBLI) under the International Standard Industrial Classification (ISIC) framework ([IDX, 2019](#IDX2019)). In the context of Sharia-compliant companies, JASICA serves as a valuable tool to provide specific and detailed sectoral data. This classification facilitates the identification of Sharia-compliant businesses across diverse sectors, ensuring alignment with Islamic principles while maintaining industry-specific categorization. For example, sectors like consumer goods or finance can be filtered to focus exclusively on entities that comply with Sharia regulations. The detailed sectoral breakdown in JASICA enhances the precision of financial and market analysis by enabling researchers to observe industry-specific trends among Sharia-compliant firms. It also aids stakeholders, including investors and regulators, in evaluating sectoral performance and assessing the broader implications of Sharia compliance on market dynamics.

*Event study*

An event study is a study that analyzes economic events and changes in stock prices ([Dyckman et al., 1984](#Dyckman1984)). [Bowman (1983)](#Bowman1983) Says that this study involves analyzing stock price behavior around the time of an information announcement or an event. Study events such as announcements of annual accounting earnings, changes in accounting principles, large block trades, and corporate mergers. There are three methodologies for calculating event studies ([Brown & Warner ,1985](#Brown1985)). An event study is a method that can be used easily to measure the effect of an economic event on firm value. The event study method has been widely used in accounting, finance, and economics. The usefulness of this study stems from the fact that, given the rationality in the market, the effect of an event will be immediately reflected in the asset's price. Thus, it is possible to measure the economic impact of such circumstances using the observed asset prices over a relatively short period ([Campbell et al., 1997](#Campbell1997)).

1. Mean Adjusted Return

$A\_{\left(i,t\right)}= R\_{\left(i,t\right)}- \overbar{R}\_{i}$ (1)

Notes:

$$A\_{\left(i,t\right)}= excess return for security I at day t$$

$$R\_{\left(i,t\right)}= the observed arithmetic return for security I at day t.$$

$$\overbar{R}\_{i}= Average of security i's daily returns in the estimation period$$

1. Market Adjusted Return

$A\_{\left(i,t\right)}= R\_{(i,t)}- R\_{(m,t)}$ (2)

Notes:

$$R\_{(m,t)}= return on the CRSP equally weighted index for day t.$$

1. OLS Market Model

$A\_{\left(i,t\right)}= R\_{(i,t)}- \hat{α}\_{i}- \hat{β}\_{i}R\_{(m,t)}$ (3)

Notes:

$$\hat{α}\_{i}- \hat{β}\_{i}R\_{\left(m,t\right)}= OLS values from the estimation period. $$

**Methodology**

*Data sources and samples*

The data used in this study were daily prices and stock trading volume in four sub-sectors according to the Jakarta Stock Industrial Classification (JASICA) classification. The four subsectors were Transportation, Telecommunications, Health, and Food & Beverages. The data period investigated was from October 21, 2019, to March 16, 2020. The D-day or event date was March 2, 2020, which became Indonesia's first Covid-19 case announcement.

*Analysis Technique*

This study employs two analytical approaches: Average Abnormal Return (AAR) and Trading Volume Activity (TVA). AAR is used to measure the average abnormal changes in stock returns compared to their expected normal levels, highlighting the direct impact of specific announcements on stock price movements. Additionally, TVA is incorporated to examine investor behavior by analyzing changes in trading volume activity. The combination of these approaches provides a more comprehensive understanding of market reactions and investor behavior during the observation period ([Brown & Warner, 1985](#Brown1985)).

The steps in carrying out the analysis technique are as follows [(Brown & Warner, 1985](#Brown1985)); ([Tandelilin, 2010](#Tandelilin2010)); ([BenSaïda, 2017](#BenSaïda2017)); ([Gujarati & Porter, 2009](#Gujarati2009)):

1. It identifies the events, the date of the announcement, the first case of COVID-19 in Indonesia, and its impact on stock issuers in the pharmaceutical, food and beverages, transportation, and telecommunication sectors listed on the IDX in 2020.
2. The observation period took 21 days: ten days before the announcement date (t-10), (t-0), and ten days after the announcement date (t+10). Thus, the observation period determines to anticipate premature market reactions before the announcement date.

t-10

t-0

t+10

Observation Period

Figure 3.1 Research Event Windows

1. The stock return using the equation

 *Rit* = $\frac{Pt-Pt-1}{Pt-1}$ (4)

Notes:

|  |  |  |
| --- | --- | --- |
| Ri, t | = | Daily return of i shares in t period  |
| Pt | = | Share price in t period |
| Pt -1 | = | Share price in t-1 period |

1. The expected return of shares using the mean-adjusted model approach

|  |  |  |
| --- | --- | --- |
| ERit | = | Average return in 80 days before the announcement |

1. Calculating abnormal returns with equation

 ARit = Abnormal Return of the security i in the event period t

Notes:

|  |  |  |
| --- | --- | --- |
| ARit | = | Daily return of i shares in t period  |
| Rit | = | Actual Return of the security i in the event period t |
| ERit | = | Expected return of the security i for the event period t |

1. Calculating the Average Abnormal Return (AAR) for the period before and after the announcement date of the first COVID-19 case in Indonesia with the equation

 AARt = $\frac{1}{N}\sum\_{i=1}^{n}ARit$ (6)

Notes:

|  |  |  |
| --- | --- | --- |
| AARt | = | Average of abnormal income in the t period |
| n | = | Number of shares |
| ARit | = | Abnormal Return of I stock in t period |

1. Trading Volume Activity (TVA) for the period before and after the date of the announcement.

 TVAit = $\frac{Σ shares traded at t period}{Σ shares issued on the IDX at t period}$ (7)

1. Paired sample t-test to see the differences before and after the event. The processed sample is the result of Average Abnormal Return (AAR) and Average Trading Volume Activity (TVA) before and after the announcement of the first COVID-19 case in Indonesia by determining the level of significance (LOS) of 5%.
2. The hypothesis was tested using the one-sample t-test to test the market reaction towards announcing the first COVID-19 case in Indonesia. The processed sample is the result of Average Abnormal Return (AAR) before and after the report of the first COVID-19 case in Indonesia by determining the significance level (LOS) of 5%.

# Result and Discussion

*Investor behavior*

Investor behavior in this study is reflected by changes in Average Trading Volume Activity (TVA) before and after the announcement. Trading volume can be considered a factor of investor behavior where the stock trading volume reflects bullish or bearish investors ([Thampanya et al., 2020](#Thampanya2020)). TVA also helps in explaining the return indirectly ([Hsieh, 2014](#Hsieh2014)). The following are the results of the paired sample t-test test before and after the announcement of the first COVID-19 case in Indonesia in all sub-sectors:

Table 1. Results of the Paired-Sample t-test of Average Trading Volume Activity

|  |  |  |  |
| --- | --- | --- | --- |
| **Sub-Sector** | **t-value** | **Probability-t** | **Hypothesis Result** |
| Pharmaceutical | 3.8772 | 0.0019 | H1 Accepted |
| Food and Beverages | -0.8699 | 0.2035 | H1 rejected |
| Telecommunications | 0.662 | 0.262 | H1 rejected |
| Transportation | -0.155 | 0.442 | H1 rejected |

Source: Statistical Result

ATVA in pharmaceutical sub-sector stocks increased significantly after the announcement with a t value of 3.8772 and a t probability of 0.0019. It indicates that investors responded to the information by actively buying and selling shares after the announcement. Pharmaceutical stocks increased significantly due to the COVID-19 pandemic and Lockdown. Investor's heavily hunting Pharmaceutical stocks, so prices are rising. The cost of pharmaceutical supplies has increased dramatically. The price increase range is between 18% - 424% ([Bisnis.com, 2020)](#Bisnis2020). Investors assume that the pharmaceutical sub-sector will survive and there will be an improvement in the company's performance. With the spike in cases of COVID-19, there was an increase in the need for medical devices for health services during the pandemic; many pharmaceutical business segments experienced a rise. Investors are interested in the prospects of the pharmaceutical industry in the future.

There is no change in TVA in the food and beverages sub-sector. Investors can assume that the food and beverages sub-sector will not be affected by the COVID-19 pandemic. The food and beverages industry generally persists because people always need consumer goods, and there is no decrease in demand. Most consumer goods sector issuers managed to maintain their performance growth amidst business challenges due to the COVID-19 pandemic. For many companies that have released financial statements in the first half of 2020, consumer goods sector issuers are the most superior sector compared to other industries ([Ulfah, 2020](#Ulfah2020)).

Shares of the telecommunications sub-sector did not show a significant change in TVA's response to the COVID-19 pandemic. Investors are still interested in this sub-sector because telecommunications is one of the basic needs of society, especially in today's digital era. Equity analysts ([Ocktaviani, 2020](#Ocktaviani2020)) estimate the telecommunication sector as one of the resilient sectors, with minimal impact on performance, because the public's need for data and information access increases.

There are no significant TVA differences in the transportation sub-sector. On average, investors still conduct stock trading activities in this sector typically. The transportation sector was also affected by the Covid-19 pandemic due to decreased mobility. However, logistics remain the focus because the coronavirus makes people use shipping for their food and beverages ([Demus, 2021](#Demus2021)).

*Abnormal return*

In the research event study, analyzing abnormal returns was done to see the efficiency of a market ([Fama, 1970](#Fama1970)) ([Brown & Warner, 1985](#Brown1985)). The investor will get an excess return if the abnormal return is positive. Below is the result of the daily Average Abnormal Return (AAR) of all sub-sectors during the event period:

Table 2. Results of the Paired-Sample t-test of Average Abnormal Return

|  |  |  |  |
| --- | --- | --- | --- |
| **Sub-Sector** | **t-value** | **Probability-t** | **Hypothesis Result** |
| Pharmaceutical | 0.8462 | 0.2097 | H1 Rejected |
| food and beverages | 0.8390 | 0.2116 | H1 Rejected |
| Telecommunications | -2.087 | 0.0332 | H1 Accepted |
| Transportation | -0.3675 | 0.3609 | H1 Rejected |

Source: Statistical Results (processed)

The paired-sample t-test shows pharmaceutical, food, beverages, and transportation sub-sectors revealed that all sub-sectors did not significantly differ in abnormal returns before and after the information in the first case of COVID-19 in Indonesia. Investors had likely anticipated this before the President of the Republic of Indonesia officially announced it. Investors have taken the proper steps to adjust to the movement of prices in the market. So, the abnormal return obtained by investors is still within reasonable limits. Furthermore, investors can predict the signal of COVID-19 cases in Indonesia because other countries have already announced cases of COVID-19. We conduct more specific investigations by conducting a one-sample t-test on abnormal return data daily to see significant changes in abnormal returns each day around the date of the event. The table 3 below shows the results of all sub-sectors.

The one-sample t-test using the pharmaceutical sub-sectors daily period found a negative abnormal return at t-2 and t-1 with t values ​​of -2.96 and -3.01. Before the official announcement, this sub-sector had negative AR. However, after the information, there were significant positive changes in abnormal returns in t+1, t+2, and t+3. The market reacted immediately after the announcement, and investors predicted this sub-sector had an increase in the company's performance. Pandemics will increase the demand for medicines and medical devices. Surprisingly, at t+4, t+5, t+7, and t+10, there was significantly negative AR. At that time, there is a possibility of a decrease in investor confidence in this sub-sector.

Table 3. Results of the One-Sample t-test of Average Abnormal Return

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Pharmaceutical** | **food and beverages** | **Telecommunications** | **Transportation** |
| **AAR** | **t total** | **Sig** | **AAR** | **t total** | **Sig** | **AAR** | **t total** | **Sig** | **AAR** | **t total** | **Sig** |
| -10 | -0.0108 | -1.1334 | 0.1542 | 0.0008 | 0.2535 | 0.4025 | -0.0041 | -0.7560 | 0.2459 | 0.0059 | 1.2041 | 0.1243 |
| -9 | 0.0047 | 0.8609 | 0.2143 | 0.0109 | 2.4053 | 0.0185 | 0.0246 | 2.2568 | 0.0435 | 0.0118 | 3.4806 | 0.0018 |
| -8 | 0.0435 | 2.1196 | 0.0438 | 0.0048 | 1.4290 | 0.0917 | 0.2002 | 1.7494 | 0.0776 | 0.0057 | 1.3344 | 0.1017 |
| -7 | -0.0056 | -0.9307 | 0.1974 | 0.0029 | 0.5650 | 0.2923 | -0.0149 | -18692 | 0.0675 | 0.0025 | 0.5964 | 0.2802 |
| -6 | -0.0094 | -1.3053 | 0.1243 | -0.0089 | -2.9985 | 0.0067 | 0.0155 | 0.6645 | 0.2714 | -0.0092 | -1.9684 | 0.0346 |
| -5 | -0.0069 | -0.5681 | 0.2973 | -0.0099 | -1.9120 | 0.0425 | -0.0161 | -2.8944 | 0.0222 | -0.0300 | -2.4463 | 0.0141 |
| -4 | -0.0109 | -0.6947 | 0.2591 | -0.0101 | -1.4308 | 0.0915 | 0.0078 | 0.8264 | 0.2275 | -0.0114 | -1.2265 | 0.1201 |
| -3 | -0.0295 | -1.8463 | 0.0621 | -0.0148 | -4.1139 | 0.0010 | -0.0100 | -1.4204 | 0.1143 | -0.0251 | -3.1936 | 0.0033 |
| -2 | -0.0428 | -2.9605 | 0.0157 | -0.0329 | -3.9961 | 0.0013 | -0.0173 | -2.1246 | 0.0504 | -0.0202 | -1.4285 | 0.0875 |
| -1 | -0.0610 | -3.0192 | 0.0147 | -0.0422 | -1.9918 | 0.0372 | -0.0196 | -0.6513 | 0.2752 | -0.0202 | -1.4981 | 0.0782 |
| 0 | 0.0543 | 1.3189 | 0.1222 | -0.0225 | -1.8090 | 0.0503 | -0.0081 | -0.8112 | 0.2314 | 0.0042 | 0.3191 | 0.3772 |
| 1 | 0.0797 | 2.0628 | 0.0471 | 0.0689 | 2.3358 | 0.0208 | 0.0171 | 1.1576 | 0.1557 | 0.0277 | 2.9329 | 0.0055 |
| 2 | 0.0319 | 2.3279 | 0.0337 | 0.0442 | 1.4614 | 0.0689 | 0.0185 | 1.1140 | 0.1639 | 0.0361 | 1.6483 | 0.0608 |
| 3 | 0.0964 | 2.8031 | 0.0189 | 0.0205 | 1.3959 | 0.0965 | -0.0031 | -0.2702 | 0.4002 | 0.0126 | 1.4157 | 0.0894 |
| 4 | -0.0304 | -2.8709 | 0.0175 | -0.0171 | -2.4271 | 0.0178 | -0.0374 | -4.8996 | 0.0040 | -0.0203 | -3.1359 | 0.0036 |
| 5 | -0.0815 | -3.9605 | 0.0054 | -0.0572 | -3.8340 | 0.0016 | -0.0759 | -4.9450 | 0.0039 | -0.0566 | -4.1326 | 0.0005 |
| 6 | 0.0403 | 1.8466 | 0.0620 | 0.0231 | 2.1079 | 0.0306 | 0.0174 | 2.6059 | 0.0298 | 0.0139 | 2.3853 | 0.0159 |
| 7 | -0.0511 | -3.2702 | 0.0111 | 0.0052 | -0.8329 | 0.2122 | -0.0623 | -5.4603 | 0.0027 | -0.0188 | -1.8841 | 0.0402 |
| 8 | -0.0384 | -1.7771 | 0.0679 | -0.0375 | -5.3251 | 0.0002 | -0.0632 | -5.0189 | 0.0037 | -0.0515 | -7.46581 | 0.0000 |
| 9 | -0.0007 | -0.0360 | 0.4863 | -0.0135 | -1.1586 | 0.1368 | -0.0268 | -1.6135 | 0.0910 | -0.0182 | -1.7520 | 0.0508 |
| 10 | -0.0434 | -4.1571 | 0.0044 | -0.0374 | -4.2041 | 0.0009 | -0.0547 | -6.0385 | 0.0019 | -0.0482 | -9.6945 | 0.0000 |

Source: Statistical Results (processed)

In the food and beverages sub-sector, there was a negative abnormal return at t-6, t-3, t-2, and t-1 with t-values ​​of -2,99, -4,11, -3,99 and -1,99 with probability t of 0.0067, 0.001, 0.0013 and 0.0372. These results explained that investors have first responded to concerns about the spread of the COVID-19 virus in Indonesia, impacting increasing volatility in the stock market. Regional quarantine policies in several countries have also worsened the stock prices in various sectors, including the food and beverages sector, resulting in negative abnormal returns before the announcement. After the first COVID-19 case announcement, investors responded with a positive abnormal return in periods t + 1 and t + 6 with t values ​​of 2.34, 2.11, and probability t of 0.0208 and 0.0306, respectively. This abnormal positive return was due to investors reconsidering the prospects for companies in the food and beverages sector, which tend to be more resilient to crisis conditions. The reason is that consumer products are basic needs in any situation. However, in the t + 4, t + 5, t + 8, and t + 10 periods, food and beverages sector stocks re-recorded negative abnormal returns due to market concerns regarding deteriorating national and global economic conditions. Of the 21 observation days, there were 11 days the market reacted to this event. However, the results occur fluctuations in AR results daily. Investors are likely confused about the impact of the content of information. The food and beverages industry is still affected both positively and negatively.

The results of the one-sample t-test in the telecommunication sub-sector show that there was a negative abnormal return in the period t + 4, t + 5, t + 7, t + 8, and t + 10 with t values ​​of -4,89, -4,95, -5,46, -5,02 and -6,04 respectively with probability t of 0.004, 0.0039, 0.0027, 0.0037 and 0.0019. These results define that investors responded to the announcement of the first COVID-19 case in Indonesia as bad news. Concern about the increasingly high and rapid spread of the COVID-19 virus could worsen the economic situation. Furthermore, implementing regional quarantine has resulted in many employees being laid off and decreased purchasing power. Above all, the domino effect of the decline in people's purchasing power.

In the one-sample t-test with a daily transportation sub-sector, there was a negative abnormal return in the midst of the before and after the announcement. The average abnormal return before the announcement was -0.009, and the average abnormal return after the announcement was -0.012. There was an abnormal average of negative return on daily observations before the announcement, namely in the t-6, t-5, and t-3 periods. The respective t values are -1.97, -2.45 and -3.19 with a probability t of 0.0346, 0.0141 and 0.0033. In addition, negative average abnormal returns were found after the announcement, namely in the t + 4, t + 5, t + 8, and t + 10 periods. The respective t-values are -3.14, -4.13, -7.46 and -9.69. The result shows that investors responded to concern over the spread of the Covid-19 virus in Indonesia. The virus, which spreads and has exponential growth, has made several countries take serious action by implementing lockdowns. The Lockdown includes restrictions on social mobility through land, water, and air transportation. Research ([He et al., 2020](#He2020)) also stated that the COVID-19 pandemic adversely impacts the transportation industry. It has had a devastating impact on the transportation sector, so investors have responded before announcing the first COVID-19 case in Indonesia. The negative response continued for ten days after the announcement. It had a devastating impact on the transportation sector, as the investors responded before announcing the first Covid-19 case in Indonesia. The negative response continued for ten days after the announcement.



Source’s: Worldbank (2022)

Figure 2. Abnormal Returns (AR) for Various Sector

The chart above illustrates the abnormal returns (AR) across various sectors, highlighting how they responded before and after the announcement of the first COVID-19 case in Indonesia. The pharmaceutical sector initially showed negative AR, reflecting early market concerns, but quickly rebounded as investors anticipated increased demand for healthcare products. The food and beverages sector also experienced an initial negative response due to pandemic fears and regional quarantines but later saw a positive shift as the market recognized the sector's resilience. However, this positive momentum was short-lived, with negative AR returning as broader economic uncertainty persisted. In contrast, telecommunications and transportation sectors faced sustained negative AR, as concerns about the economic impact of the pandemic and lockdowns outweighed potential growth in these industries.

These market reactions suggest several key strategies for investors and policymakers. For investors, sectors like pharmaceuticals and food and beverages present opportunities due to their essential nature, but careful attention is needed to manage the volatility seen in the short term. In telecommunications, the focus should be on long-term growth driven by digital services, while transportation might require patience as it recovers from the immediate effects of mobility restrictions. Financial authorities should act swiftly to provide sector-specific support, especially for those most impacted by the pandemic, and maintain clear communication to reduce uncertainty. Additionally, companies should prioritize resilience and flexibility in their operations, particularly through innovation, digital transformation, and diversification, to minimize risks during future disruptions. Long-term strategic planning and sustainability will be key for industries like transportation, where recovery could be gradual, but the long-term potential remains strong.

**Conclusion**

This study investigates investor behavior and market reaction during the COVID-19 pandemic event in Indonesia. Trading volume activity (TVA) as a proxy of investor behavior and market reaction using Average Abnormal Return (AAR). This study analyzes the Indonesian stock market in response to the COVID-19 outbreak in several subsectors: pharmaceutical, telecommunications, food and beverages, and transportation. The results presented different reactions in each subsector in response to the Covid-19 outbreak. There was no difference in abnormal returns in the pharmaceutical sector before and after the announcement of the first COVID-19 case. At the same time, there was a difference before and after the report for Trading Volume Activity. It indicates that investors consider the possible positive impact on the pharmaceutical sector due to the increasing demand for health products amidst the health crisis. There was no significant difference in abnormal returns and trading volume activity in the food and beverages sector before and after the announcement of the first COVID-19 case. Investors have first responded to concerns over the spread of the Covid-19 virus in Indonesia. After announcing the first COVID-19 case, investors responded with a positive abnormal return because investors were reconsidering the prospects for companies in the food and beverages sector that tended to be more resilient to crisis conditions.

There was a significant difference in abnormal returns in the telecommunications sector before and after the announcement. At the same time, there was no difference before and after the report for trading volume activity. There was no difference in abnormal returns and trading volume activity in the transportation sector before and after the information of the first COVID-19 case. However, investors responded with negative abnormal returns in the period before and after the announcement. It is due to the presence of lockdowns that contributed to a detrimental impact on the transportation sector. The COVID-19 pandemic is an outbreak that is widespread globally and has a pretty severe impact on various sectors. The Covid-19 outbreak has caused economic turmoil both nationally and internationally. The uncertainty caused by the unpredictable condition of the COVID-19 attack has made economic conditions in various countries, including Indonesia, worsen. The stock market is a macroeconomic barometer, so the impact of the COVID-19 pandemic is reflected in the volatility of stock prices. Therefore, investors are expected to properly consider any investment decisions made during conditions of uncertainty, one of which can assess the vulnerability of specific sectors to experiencing turmoil during a pandemic.

# pressure, and curb potential criminality.

**Author Contribution**

The author's contributions to this research are as follows: Puji Sucia Sukmaningrum contributed to the creation and design of analyses and was primarily responsible for drafting and revising the manuscript. Nuradli Ridzwan Shah Bin Mohd Dali led the data collection process and provided the tools used for data analysis. Muhammad Madyan performed the statistical analysis, interpreted the results, and assisted in writing the manuscript, particularly in presenting the analysis findings. Nisful Laila contributed additional datasets and tools for data analysis, as well as assisted in performing the statistical tests and interpreting the findings. Tika Widiastuti played a significant role in designing the analysis and drafting sections of the manuscript, ensuring clarity and quality in the written content.

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Both persons and institutions with contributions to the paper-writing process can be mentioned here.

# Declaration of Competing Interest

All these authors have no competing interests.

**References**

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., & Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. Journal of Behavioral and Experimental Finance, 27, 100326. <https://doi.org/10.1016/j.jbef.2020.100326>

Aldin, I. U. (2019). Naik 1,7% Selama 2019, IHSG Kalah oleh 3 Bursa Negara di Asia Tenggara.

Alsaifi, K., Elnahass, M., & Salama, A. (2020). Market responses to firms’ voluntary carbon disclosure: Empirical evidence from the United Kingdom. Journal of Cleaner Production, 262, 1–11. <https://doi.org/10.1016/j.jclepro.2020.121377>

Alzahrani, M. (2019). Islamic corporate finance, financial markets, and institutions: An overview. Journal of Corporate Finance, 55(December 2018), 1–5. <https://doi.org/10.1016/j.jcorpfin.2018.11.008>

Anh, D. L. T., & Gan, C. (2020). The impact of the COVID-19 lockdown on stock market performance: evidence from Vietnam. Journal of Economic Studies. <https://doi.org/10.1108/JES-06-2020-0312>

Arief, T. (2018). Menjadi Terbaik Kedua di Asia, Ini Pencapaian Kinerja IHSG Sepanjang 2018.

Baaquie, B. E. (2020). Merton’s equation and the quantum oscillator: Pricing risky corporate coupon bonds. Physica A: Statistical Mechanics and Its Applications, 541. <https://doi.org/10.1016/j.physa.2019.123367>

Bai, L., Wei, Y., Wei, G., Li, X., & Zhang, S. (2020). Infectious disease pandemic and permanent volatility of international stock markets: A long-term perspective. Finance Research Letters, May, 101709. <https://doi.org/10.1016/j.frl.2020.101709>

Baig, A. S., Butt, H. A., Haroon, O., & Rizvi, S. A. R. (2020). Deaths, panic, lockdowns and US equity markets: The case of COVID-19 pandemic. Finance Research Letters, 1–9. <https://doi.org/10.1016/j.frl.2020.101701>

Bash, A., & Alsaifi, K. (2019). Fear from uncertainty: An event study of Khashoggi and stock market returns. Journal of Behavioral and Experimental Finance, 23, 54–58. <https://doi.org/10.1016/j.jbef.2019.05.004>

BenSaïda, A. (2017). Herding effect on idiosyncratic volatility in U.S. industries. Finance Research Letters, 23, 121–132. <https://doi.org/10.1016/j.frl.2017.03.001>

Bisnis.com. (2020). Saham Farmasi Kembali Menggila, Bagaimana Prospeknya? Artikel ini telah tayang di Bisnis.com dengan judul “Saham Farmasi Kembali Menggila, Bagaimana Prospeknya?”, Klik selengkapnya di sini: https://market.bisnis.com/read/20200925/189/1296697/saham-farmasi.

Bowman, R. G. (1983). Understanding and Conducting Event Studies. Journal of Business Finance & Accounting, 10(4), 561–584. <https://doi.org/10.1111/j.1468-5957.1983.tb00453.x>

BPS. (2020). Ekonomi Indonesia Triwulan II 2020 Turun 5,32 Persen.

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. Journal of Financial Economics, 14, 3–31. [https://doi.org/10.1016/0304-405X(85)90042-X](https://doi.org/10.1016/0304-405X%2885%2990042-X)

Buhagiar, R., Cortis, D., & Newall, P. W. S. (2018). Why do some soccer bettors lose more money than others? Journal of Behavioral and Experimental Finance, 18, 85–93. <https://doi.org/10.1016/j.jbef.2018.01.010>

Campbell, J. Y., Lo, A. W., & MacKinlay, A. C. (1997). Event-Study Analysis. In The Econometrics of Financial Markets (pp. 149–180). Princeton University Press. <https://doi.org/10.1515/9781400830213-008>

Chen, C.-D., Chen, C.-C., Tang, W.-W., & Huang, B.-Y. (2009). The Positive and Negative Impacts of the Sars Outbreak: A Case of the Taiwan Industries. The Journal of Developing Areas, 43(1), 281–293. <https://doi.org/10.1353/jda.0.0041>

Chen, M.-H., Jang, S. C. (Shawn), & Kim, W. G. (2007). The impact of the SARS outbreak on Taiwanese hotel stock performance: An event-study approach. International Journal of Hospitality Management, 26(1), 200–212. <https://doi.org/10.1016/j.ijhm.2005.11.004>

Demus, M. N. (2021). Punya prospek positif, cemati saham sektor transportasi dan logistik berikut ini.

Dyckman, T., Philbrick, D., & Stephan, J. (1984). A Comparison of Event Study Methodologies Using Daily Stock Returns: A Simulation Approach. Journal of Accounting Research, 22, 1–30. <https://doi.org/10.2307/2490855>

Eleftheriou, K., & Patsoulis, P. (2020). COVID-19 Lockdown Intensity and Stock Market Returns: A Spatial Econometrics Approach (100662; Issue May).

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. The Journal of Finance, 25(2).

Faozan, A. (2013). Konsep Pasar Modal Syariah. Muqtasid: Jurnal Ekonomi Dan Perbankan Syariah, 4(2), 287. <https://doi.org/10.18326/muqtasid.v4i2.287-310>

Gujarati, D. N., & Porter, D. C. (2009). Basic Econometrics (5th ed.). McGraw-Hill/Irwin.

Guo, M., Kuai, Y., & Liu, X. (2020). Stock market response to environmental policies: Evidence from heavily polluting firms in China. Economic Modelling, 86, 306–316. <https://doi.org/10.1016/j.econmod.2019.09.028>

Habibi, A., Normasyhuri, K., & Anggraeni, E. (2022). The Indonesian Sharia Capital Market in Shock Covid-19: Global Market Interaction. Equilibrium: Jurnal Ekonomi Syariah, 10(2), 381. <https://doi.org/10.21043/equilibrium.v10i2.16457>

He, P., Sun, Y., Zhang, Y., & Li, T. (2020). COVID–19’s Impact on Stock Prices Across Different Sectors—An Event Study Based on the Chinese Stock Market. Emerging Markets Finance and Trade, 56(10), 2198–2212. <https://doi.org/10.1080/1540496X.2020.1785865>

Hendratmi, A., Salleh, M. C. M., Sukmaningrum, P. S., & Ratnasari, R. T. (2024). Toward SDG’s 8: How sustainability livelihood affecting survival strategy of woman entrepreneurs in Indonesia. World Development Sustainability, 5, 100175. [https://doi.org/https://doi.org/10.1016/j.wds.2024.100175](https://doi.org/https%3A/doi.org/10.1016/j.wds.2024.100175)

Hsieh, H. C. S. (2014). The causal relationships between stock returns, trading volume, and volatility: Empirical evidence from Asian listed real estate companies. International Journal of Managerial Finance, 10(2), 218–240. <https://doi.org/10.1108/IJMF-10-2013-0103>

Ichev, R., & Marinč, M. (2018). Stock prices and geographic proximity of information: Evidence from the Ebola outbreak. International Review of Financial Analysis, 56, 153–166. <https://doi.org/10.1016/j.irfa.2017.12.004>

IDX. (2019). IDX factbook 2019. PT Bursa Efek Indonesia.

IDX. (2020). IDX Monthly Statistics.

Ihsanudin. (2020). BREAKING NEWS: Jokowi Umumkan Dua Orang di Indonesia Positif Corona.

IMF. (2020). A Crisis Like No Other, An Uncertain Recovery.

Kowalewski, O., & Śpiewanowski, P. (2020). Stock market response to potash mine disasters. Journal of Commodity Markets, 20, 1–22. <https://doi.org/10.1016/j.jcomm.2020.100124>

Li, K. (2018). Reaction to news in the Chinese stock market: A study on Xiong’an New Area Strategy. Journal of Behavioral and Experimental Finance, 19, 36–38. <https://doi.org/10.1016/j.jbef.2018.03.004>

Litimi, H., BenSaïda, A., & Bouraoui, O. (2016). Herding and excessive risk in the American stock market: A sectoral analysis. Research in International Business and Finance, 38, 6–21. <https://doi.org/10.1016/j.ribaf.2016.03.008>

Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. International Journal of Environmental Research and Public Health, 17(8), 1–19. <https://doi.org/10.3390/ijerph17082800>

Melani, A. (2021). Peluang Besar Kontribusi Pasar Modal terhadap Ekonomi RI.

Narayan, P. K., Phan, D. H. B., & Liu, G. (2020). COVID-19 lockdowns, stimulus packages, travel bans, and stock returns. Finance Research Letters, 1–7. <https://doi.org/10.1016/j.frl.2020.101732>

Ocktaviani, S. (2020). Saham emiten telekomunikasi dinilai masih menarik.

Roxby, P. (2020). Coronavirus confirmed as pandemic by World Health Organization.

Selasi, D. (2020). Dampak Pandemic Disease Terhadap Perkembangan Pasar Modal Syariah Di Indonesia. Jurnal Ilmiah Indonesia, 5(5), 46–54.

Shanaev, S., & Ghimire, B. (2019). Is all politics local? Regional political risk in Russia and the panel of stock returns. Journal of Behavioral and Experimental Finance, 21, 70–82. <https://doi.org/10.1016/j.jbef.2018.11.002>

Simorangkir, E. (2020). Entah Apa yang Merasukinya, IHSG Nyungsep 6,5%.

Situs Satuan Tugas Penanganan COVID-19. (2020). Peta Sebaran.

Szmigiera, M. (2021). Impact of the coronavirus pandemic on the global economy - Statistics & Facts.

Tandelilin, E. (2010). Portofolio dan Investasi: Teori dan aplikasi. Kanisius.

Thampanya, N., Wu, J., Nasir, M. A., & Liu, J. (2020). Fundamental and behavioural determinants of stock return volatility in ASEAN-5 countries. Journal of International Financial Markets, Institutions and Money, 65, 101193. <https://doi.org/10.1016/j.intfin.2020.101193>

Ulfah, F. U. (2020). Ini Proyeksi Emiten Sektor Barang Konsumsi di Semester II/2020 Artikel ini telah tayang di Bisnis.com dengan judul “Ini Proyeksi Emiten Sektor Barang Konsumsi di Semester II/2020”, Klik selengkapnya di sini: <https://market.bisnis.com/read/20200802/189/127.>

Wang, Y.-H., Yang, F.-J., & Chen, L.-J. (2013). An investor’s perspective on infectious diseases and their influence on market behavior. Journal of Business Economics and Management, 14(sup1), S112–S127. <https://doi.org/10.3846/16111699.2012.711360>

WHO. (2020). Archived: WHO Timeline - COVID-19.

Worldometer. (2021). Coronavirus Worldwide Graphs.