Research Paper

The Impact of the Provision of the COVID-19 Vaccine on Healthcare Stocks in Indonesia

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ARTICLE INFO	ABSTRACT
	The Coronavirus, which was firstly confirmed in Indonesia in 2020, had a hindering effect on the country's economy but a great impact on pharmaceutical companies. The first batch of vaccines that was administered in Indonesia on January 13, 2021, had a significant impact on healthcare stocks. This study examined the impact of the COVID-19 vaccine on healthcare stocks in Indonesia as seen from the stock price and the trading volume. Secondary data from 19 healthcare companies seven days before and seven days after the administration of COVID-19 vaccine was analyzed. Paired Samples t-test was carried out using the SPSS program. This study indicated that the administration of the COVID-19 vaccine has a strong impact in terms of increased changes in the healthcare stocks. Meanwhile, the trading volume decreased after the administration of the COVID-19 vaccine in Indonesia. The average of abnormal returns before and after the COVID-19 vaccine were at t-2, t+1, t+2, t+3, and t+7. Theoretically, the results of this discussion can be used as reference material for further research. In addition, it can be used in the development of knowledge in the field of stocks or pharmaceutical companies. The results of this study can practically be used as a reference for investors in making investment decisions.

Introduction

The current COVID-19 pandemic has had an assortment of negative consequences around the world, including an economic downturn in Indonesia. The COVID-19 virus was firstly

confirmed in Indonesia on Monday, 2 March 2020. Data from Bloomberg shows that the JCI had fallen to its lowest level at 3,937.63 on 23 March 2020. In contrast to the negative impact felt by the JCI, the surge of Coronavirus has a positive effect on the stock performance of pharmaceutical companies (He et al., 2022). This can be seen from the unnatural increase in stock prices of pharmaceutical companies. The sharp rise in stocks of the pharmaceutical company was caused by the public awareness of the development of the COVID-19 vaccine.

The movement of stocks of pharmaceutical issuers listed on the Indonesia Stock Exchange (IDX) appeared a critical increment in 2020 (Anwar et al., 2021). Despite the fact that not all issuers had strong financial performance in the first half of 2020, investors were intrigued by the prospects. The financial performance of Kimia Farma, Indofarma, and Phapros in the first semester of 2020 is not encouraging. Kimia Farma's sales grew by 3.8% only, while Phapros sales decline by 17.8%. Only Indofarma saw a significant increase in sales, reaching 23%. However, during the first six months of 2020, Indofarma suffered a loss of up to Rp 24.35 billion. Investors may believe that KAEF and INAF's performance will improve greatly if Bio Farma's collaboration with Sinovac to create the COVID-19 vaccine produces positive results. It will be distributed by KAEF and INAF (Katadata, 2020).

Table 1. Summary of Stock Prices and Supporting Services of Pharmaceutical Companies from March to December 2020 (Indopremier, 2020)

No	Name	%CHG	CHG	Close	Prev	High	Low	High Date	Low Date
1	INAF Indofarma TBK.	799.55	3,582		448	5,250	452	08 12 2020	02 03 2020
2	KAEF Kimia Farma TBK.	632.76	3,670	4,250	580	5,450	575	08 12 2020	02 03 2020
3	PYFA Pyridam Farma TBK	438.67	794	975	181	1,575	141	24 07 2020	16 03 2020
4	IRRA Itama Ranoraya TBK.	156.00	975	1,600	625	1,775	448	08 12 2020	23 03 2020
5	SOHO Soho Global Health TBK.	152.75	2,780	4,600	1,820	16,300	2,270	23 09 2020	08 09 2020
6	PEHA Phapros TBK.	88.33	795	1,695	900	2,590	655	08 12 2020	20 03 2020

No	Name	%CHG	CHG	Close	Prev	High	Low	High Date	Low Date
7	MERK Merck TBK.	70.39	1,355	3,280	1,925	4,450	1,170	17 07 2020	24 03 2020
8	SIDO Industri Jamu dan Farmasi Sido Muncul TBK.	30.89	190	805	615	860	452	26 10 2020	23 03 2020
9	KLBF Kalbe Farma TBK.	21.31	260	1,480	1,220	1,695	830	21 07 2020	26 03 2020
10	DVLA Darya-Varia Laboratoria TBK.	12.56	270	2,420	2,150	3,130	1,920	14 08 2020	13 03 2020

Table 1 depicts an abnormal rise in pharmaceutical stocks due to euphoria over the discovery of a COVID-19 vaccine and the assumption of selling COVID-19 antivirals, which made pharmaceutical stocks highly sought after. As a result, the price of pharmaceutical stocks continues to rise. Another trigger is the COVID-19 pandemic, which is still spreading, causing individuals to spend a lot of money on vitamins and other health products (Summan & Nandi, 2022). The price of pharmaceutical stocks has risen significantly over the last year, ranging from 12% to 799% (INAF stock) from the year's low point on December 8, 2020.

Because both are subsidiaries of the Pharmaceutical SOE Holding, PT Bio Farma, pharmaceutical stocks, particularly the two SOEs, KAEF and INAF, have been a source of concern (Persero). The entrance of the Sinovac vaccine in the country aided the rise of the two pharmaceutical companies (Arifin & Anas, 2021). The increase in the majority of pharmaceutical stocks that have shot up since the Sinovac vaccine arrived in Indonesia for the first time is considered peculiar. The stocks of PT Itama Ranoraya Tbk. (IRRA), a syringe distributor was also ignited and forced to be locked by the Indonesia Stock Exchange after experiencing ARA (Upper Auto Rejection) on trading Monday (10/1/2021) and strengthening for nine consecutive days almost 90% since the end of December 2020. Even though several pharmaceutical issuers have had price-earnings ratios (PER) hundreds of times or include stocks with expensive valuations. Based on Bloomberg data, INAF has PER at 899.93 times and IRRA at 178.29 times. PER and the ratio of Price to Book Value (PBV) of

several pharmaceutical stocks have soared and beyond reasonable limits (Market Bisnis, 2021).

The increase in stock prices is due to the market's excessive optimism in judging the company's stocks, resulting in information asymmetry and making the market inefficient because the information supplied is not represented in its stock price. This optimism is a form of investor confidence response to emerging news on the prospects for the performance of pharmaceutical companies in the future. Investors will receive abnormal returns in the stock market as a result of the information gained in this inefficient market (Pasanda & Mildawati, 2015). In an efficient market, investors will not receive abnormal returns because there is no other information that can cause the stock price to move abnormally. Investors can only make abnormal returns if they have relevant information that others do not have, implying that the present stock price does not yet reflect all relevant information or that markets are inefficient (Kusnandar & Bintari, 2020). Rachman and Ervina (2017) confirmed the impact of the bond announcement on the performance of the stock market and indicated that the stock market in Indonesia was inefficient.

Research on market reactions to an event whose information is published as an announcement or news can be known through an event study. Event studies can be performed to evaluate an announcement's information content as well as market efficiency. If the announcement contains information, it is expected that the market will react at the time the announcement is received by the market indicated by a change in the stock price. This reaction can be assessed using an abnormal return, which states that an announcement with information content will provide the market with an abnormal return (Pasanda & Mildawati, 2015). Research on the impact of corporate actions, as well as health, economic, and political issues in a country, on stock prices, has been carried out by Winanti (2021) who stated that there were differences in the stock prices of Islamic banks before and after the announcement of the COVID-19 case in Indonesia. This is corroborated by Wahyuni and Widiasmara (2017) who found differences in abnormal returns of LQ45 stocks before and after the announcement of Donald Trump's victory as US president in 2016.

Blaufus et al. (2019) also identified stock prices that reacted positively to news of permissible tax planning in Germany. Burggraf et al., (2019) found that tweets from Donald Trump's account related to the trade war with China made a negative return on the S&P 500 index. Narayan and Narayan (2017) added that news about oil prices had a significant effect on NYSE stock prices. Different research results were found by Fernando, Putu, and Suryantini, (2018) that there was no difference in LQ45 stock returns before and after the announcement of the tax amnesty. Chhetri and Baral (2018) also found no difference between before and after the merger announcement of the stock prices.

The existence of political and economic news concerns, whether still rumors or positively acknowledged by the party giving the decision, causes information asymmetry, which can make the market inefficient. This can be noticed not just in stock price movements, but also in the trading volume that took place at the time. This is corroborated

by Khajar (2016) that the announcement of stock split significantly reduces the amount of trading volume. However, it is different from the results of a study conducted by Rahmawati and Prijati (2019) and Yustisia (2018) stating that there is no variation in the trading volume before and after the stockpile announcement.

The author should re-examine the effect of news announcements or issues that arise in a country on stock prices due to the disparity in the research results. The coronavirus was only discovered at the end of 2019, and there is currently little research on the virus's impact on a country's economy. Because the Coronavirus is considered to have a major economic influence on the world, it is critical to perform a study into the impact of the outbreak. Because no one had done the research, news about the discovery of vaccinations as a strategy to curb the spread of the Coronavirus and the inauguration of the first vaccine injection in Indonesia became interesting to study in conjunction with changes in Indonesia's capital market conditions at the time. As a result, the findings of this study will show whether the public favors the use of vaccine injections as a means of reviving the Indonesian economy in the face of COVID or vice versa. The findings of the study on the impact of vaccine implementation news on stock prices will be a new finding on whether investors should pay attention when deciding whether to buy shares, particularly in the healthcare industry in Indonesia because vaccines and health are involved.

The influence of the first COVID-19 vaccination announcement in Indonesia on stock prices of pharmaceutical businesses and their supporting services is explored in this study. The researchers took samples from the Healthcare companies listed on the Indonesia Stock Exchange (IDX) in 2020, based on the IDX's decision on January 25, 2020, which implements a new classification of listed companies and industries called the "Indonesia Stock Exchange Industrial Classification" or IDX-IC.

Hypotheses Development

Stock prices are the prices that occur on the stock market at a specific period and are decided by market supply and demand (Jogiyanto, 2010). When there is an overabundance of demand for a stock, the price tends to rise. When there is an excess supply, on the other hand, the stock price tends to fall. Stock prices are highly dependent on various factors, such as the company's management, current earnings, future earnings, and the economic environment that affects the capital market. In addition, stock prices are also influenced by external factors such as investor behavior, government policies, problems abroad, and so on.

The concept of an efficient market was first proposed and popularized by Fama et al. (1970). The capital and money markets are referred to as the market in this context. A market is said to be efficient if no one, including individual investors and institutional investors, can obtain abnormal returns, after adjusting for risk, using existing trading strategies. This means that the prices formed in the market are a reflection of existing information, in other words, stock prices reflect all available information. According to

Fama et al. (1970), the efficient form of the market can be grouped into three, known as the efficient market hypothesis. The three forms of the efficient market are the weak-form efficient market hypothesis, the semistrong-form efficient market hypothesis, and the strong-form efficient market hypothesis. Each form of an efficient market is closely related to the extent to which information absorption occurs in the market.

An event study is used to study the effect of economic events on the stock price of the company. According to MacKinlay (1997), event study is used for various economic events such as mergers and acquisitions, earnings announcements, and others. Generally, event study time consists of an estimation window, event window, and post-event window (Woon, 2004). The estimation window describes the period between T0-T1 of the stock price from before the announcement of the event. The event window is defined as the announcement period (0). This event window also explains what happened to the stock price before and after the announcement. The post-event window refers to expectations of long-term events which aim to see stock price movements after the event window.

An event study is usually used to analyze the measurement of an event on the dependent variable which can be reflected in its stock price. In the theory of the Efficient Market Hypothesis (EMH), it is stated that the market is efficient if the stock price of a company fully describes the information about the stock. This information can be in the form of financial news, political information, economics, company policies, or other events that are reflected in the stock price. Information on the announcement of the vaccine provision is included in the semistrong-form of an efficient market. This vaccine announcement information is critical for investors, particularly those seeking further information to gain abnormal market returns. This difference in the information received by investors will cause asymmetric information and create excessive sentiment toward the market. This confirms the results of the study carried out by Bouattour and Martinez (2019) that Market efficiency is affected by uncertainty and information asymmetry, with information asymmetry having a pronounced impact.

H1: *There is a difference in stock prices before and after the COVID-19 vaccination.*

Trading volume is the total transaction that occurs in a period where volume is a single indicator that can describe the level of market saturation (investors) and volume can describe the level of strength of trend movements. According to Firmansyah (2016), trading volume is the ratio between the number of shares traded and the number of outstanding shares. Trading volume can assess the market reaction to events or even information related to stock. Changes in trading volume can be measured by Trading Volume Activity (TVA).

TVA is used to compare the shares traded and the shares outstanding. Changes in stock trading volume can be seen in the strength between supply and demand from the activities of investors in the capital market. Stock trading volume can be said to increase if the buying and selling activity of investors has increased in the capital market. For example, if the trading volume increases, it can affect the rise and fall of stock prices in the capital

market. So, an increase in stock trading volume shows that the stock is in demand by investors so that it can affect the price increase or stock return.

H2: *There is a difference in trading volume before and after the COVID-19 vaccination.*

An abnormal return is a difference between the actual return and the expected return. Abnormal returns can also serve as a basis for testing market efficiency. The market will be said to be efficient if no market participants see abnormal returns over a long enough period. Abnormal returns usually occur around the announcement of an event. It arises due to a significant increase in trading activity in the market (Kusnandar & Bintari, 2020).

Liu et al. (2020) explained that the short-term impact of the outbreak on 21 leading stocks of countries in Asia experienced an abnormal that was more unfavorable than other countries. Kusnandar and Bintari (2020) also explained the abnormal return before and after the announcement of changes in trading times for exchange transactions on the Indonesia Stock Exchange during the COVID-19 pandemic. The difference is in the results of the analysis of Utami (2019) which indicates that the stocks in the ISSI index have no abnormal returns. This is due to the publication of regular reports to minimize information asymmetry.

H3: *There are average abnormal returns before and after the announcement of the COVID-19 vaccination.*

Based on the literature review, an empirical research model in this study is presented in Figure 1.
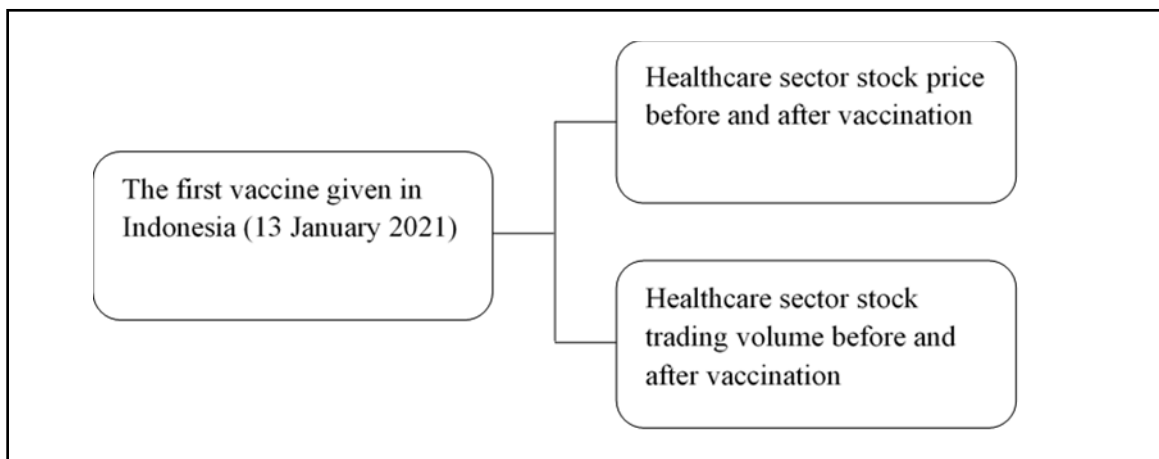

Figure 1. The framework of the Study

Method

Sample Selection and Data Sources

This study employed an event study as its method. An event study studies market reactions to events whose information is published as an announcement. Drawing on the secondary data, this study involved closing stock price and total trading volume obtained from www.yahoo.finance.com. This study focuses on the effect before and after the

COVID-19 vaccination on stock prices and the total trading volume in the healthcare sector. The timeline of this study is illustrated in Figure 2.
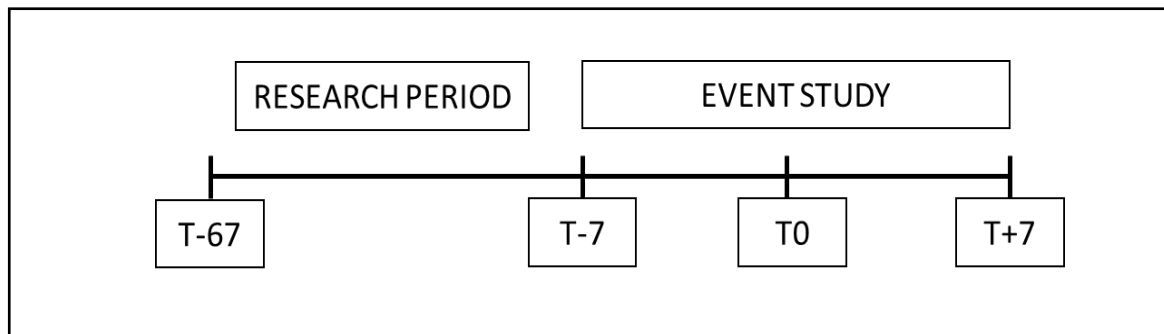

Figure 2. Research Period in Event Study

The sample used in this study is stock prices and trading volume of firms in the healthcare sector on the Indonesia Stock Exchange (IDX) in 2021, before and after the vaccine is administered in Indonesia on January 13, 2021. Purposive sampling was done by providing criteria that must be met by the research sample. The healthcare companies on the Indonesia Stock Exchange (IDX) in 2021, before and after vaccines are given in Indonesia, were chosen as the sample criteria because they have all of the data that researchers require, such as stock price data and trading transaction volume during the observation period. If a company does not match these requirements, it will not be included in the study.

There are 19 companies in the healthcare sector on the Indonesia Stock Exchange (IDX). Data of the company was observed for 14 days of seven days before vaccination on January 04, 2021, to January 12, 2021, and seven days after the vaccination from January 14, 2021, to January 22, 2021. Secondary data were obtained from www.id.investing.com. The analytical tool used by the researcher was the Paired Sample T-Test to determine the difference in stock prices and the total trading volume before and after the COVID-19 vaccination in Indonesia.

Table 2. List of Healthcare Companies on the Indonesia Stock Exchange in 2021 (IDX, 2021)

Code	Name	Sector	Sector Name	Sub Industry	Sub-Industry Name	Instrument
IRRA	Itama Ranoraya Tbk.	F	Healthcare	F112	Healthcare Supplies & Distributions	Stock
CARE	Metro Healthcare Indonesia Tbk.	F	Healthcare	F121	Healthcare Providers	Stock

Code	Name	Sector	Sector Name	Sub Industry	Sub-Industry Name	Instrument
HEAL	Medikaloka Hermina Tbk.	F	Healthcare	F121	Healthcare Providers	Stock & Debenture
MIKA	Mitra Keluarga Karyasehat Tbk.	F	Healthcare	F121	Healthcare Providers	Stock
PRDA	Prodia Widyahusada Tbk.	F	Healthcare	F121	Healthcare Providers	Stock
PRIM	Royal Prima Tbk.	F	Healthcare	F121	Healthcare Providers	Stock
SAME	Sarana Meditama Metropolitan Tbk.	F	Healthcare	F121	Healthcare Providers	Stock
SILO	Siloam International Hospitals Tbk.	F	Healthcare	F121	Healthcare Providers	Stock
SRAJ	Sejahteraraya Anugrahjaya Tbk.	F	Healthcare	F121	Healthcare Providers	Stock
DVLA	Darya-Varia Laboratoria Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
INAF	Indofarma Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
KAEF	Kimia Farma Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
KLBF	Kalbe Farma Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
MERK	Merck Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
PEHA	Phapros Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
PYFA	Pyridam Farma Tbk	F	Healthcare	F211	Pharmaceuticals	Stock
SIDO	Industri Jamu dan Farmasi Sido Muncul Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock

Code	Name	Sector	Sector Name	Sub Industry	Sub-Industry Name	Instrument
SOHO	Soho Global Health Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock
TSPC	Tempo Scan Pacific Tbk.	F	Healthcare	F211	Pharmaceuticals	Stock

Variable Operations

Abnormal returns are the difference between the actual return and the expected return. According to market theory, the measurement of return can be formulated as follows (Jogiyanto, 2015):

$$ARit = Rit - E[Rit]$$

Where:

$ARit$ = Stock return i in the period to t

Rit = closing price i in period t

$E[Rit]$ = closing price i in the previous period

The stages taken to calculate the abnormal returns are:

1. Actual return (Rit)

    The actual return is the return that has occurred (Jogiyanto 2015). Return realization is calculated using historical data. The formula used to calculate the actual return is:

$$Rit = \frac{Pt - Pt-1}{Pt-1}$$

Where:

Rit = actual return of i stock on day to t

Pt = price of i stock on day to t

$Pt-1$ = price of i stock earlier in the day (t-1)

2. Expected return (E[Rit])

    The expected return is the return expected by investors in the future (Jogiyanto, 2015). The model used to calculate the expected return in this study is a single-index model (SIM). The formula used is as follows:

$$E[Rit] = ai + \beta i\ [Rmt]$$

Where:

$E[Rit]$ = Expected return shares on day t

ai = the expected value of a stock return that is independent of the market return.

Results

This study discusses stock prices and trading volume in healthcare sector companies. A descriptive analysis of stock prices from January 4, 2021 to January 22, 2021 is illustrated in Table 3.

Table 3. The Healthcare Stock Prices

	Stock Prices before Vaccination	Stock Prices after Vaccination
N	133	133
Minimum	1.030	1.000
Maximum	5375.000	7250.000
Mean	362.39060	435.47748
Std. Deviation	1089.060329	1374.105766

The lowest stock price of healthcare companies before vaccination was 1,030 while the highest was 5,375. Meanwhile, the lowest stock price of healthcare sector companies after vaccination fell to 1,000 and the highest rose to 7,250. The average stock price before the vaccine was 362.39, but it rose to 435.48 after the COVID-19 vaccine was implemented in Indonesia. Meanwhile, the standard deviation both before and after the COVID-19 vaccine is worth more than the average value. This suggests that the average value is less able to explain the overall data due to the diverse data. because the stock price of any firm in the healthcare company has a pretty wide range of variances between the lowest and highest values.

Table 4. Trading Volume of Healthcare Companies (in Million)

	Trading Volume before Vaccination	Trading Volume after Vaccination
N	132	132
Minimum	.003	.008
Maximum	730.880	467.720
Mean	60.87557	41.96154
Std. Deviation	128.327881	88.280332

The lowest trading volume for healthcare companies before vaccination was 0.003 or roughly 3,000 while the highest was 730.88 million (see Table 4). Meanwhile, the lowest trading volume of healthcare companies after vaccination rose to 0.008 or around 8,000 and the highest fell to 467.72 million. Meanwhile, the average trading volume before the vaccine was 60.87 million and decreased to 41.96 million after the COVID-19 vaccine was carried out in Indonesia. The standard deviation of trading volume both before and after the COVID-19 vaccine is also worth more than the average value. This suggests that the average value is less able to explain the overall data due to the diverse data. This variety occurs because the trading volume in each company in the healthcare sector has a fairly

high range of differences as seen from the minimum value and maximum volume of trade transactions.

Normality Test

The normality test in this study used the Kolmogorov-Smirnov test. Previously, The Kolmogorov-Smirnov test on stock price data yielded abnormal results, causing researchers to eliminate outlier data from the original data of 133, resulting in data n of as high as 102. After the normality test, significant values of above 0.05 were obtained both in stock price before and after the vaccine of 0.092 and 0.180, respectively. This means that data on the stock price in this study are normally distributed. Thus, the hypothesis testing used the paired sample t-test.

Table 5. Normality Test- Kolmogorov-Smirnov

	Stock Prices Before Vaccine	Stock Prices After Vaccine
Statistic	.081	.075
Df	102	102
Sig.	.092	.180

Meanwhile, for stock trading volume data in healthcare sector companies, the significant figures are obtained in Table 6, which shows numbers of 0.000 and 0.000, both of which are below 0.05. This means that the data is not normally distributed so the second hypothesis was tested using the Wilcoxon Signed-rank test.

Table 6. Tests of Normality- Kolmogorov-Smirnova

	Trading Volume Stocks Before Vaccine	Trading Volume Stocks After Vaccine
Statistic	.318	.321
Df	132	132
Sig.	.000	.000

Table 7 shows the normality test on abnormal return values during the 15-day study period and also the normality value of the average abnormal return before and after the announcement of the COVID-19 vaccine. Those that pass the normality test have significance values greater than 0.05, which are TMIN7, TMIN5, TMIN4, TMIN1, TNOL, TPLUS1, TPLUS2, TPLUS3, TPLUS4, TPLUS6, and ARRBEFORE. These data were analyzed using the paired t-test. Data that do not pass the normality test because it has a significance value below 0.05 are TMIN1, TMIN3, TMIN2, TPLUS5, TPLUS7, and ARRAFTER. They were analyzed using the Wilcoxon Signed-Rank Test.

Table 7. ARR Normality Test

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
TMIN7	.162	18	.200*
TMIN6	.285	18	.000
TMIN5	.103	18	.200*
TMIN4	.192	18	.077
TMIN3	.332	18	.000
TMIN2	.210	18	.035
TMIN1	.188	18	.094
TNOL	.196	18	.067
TPLUS1	.179	18	.132
TPLUS2	.149	18	.200*
TPLUS3	.189	18	.087
TPLUS4	.130	18	.200*
TPLUS5	.238	18	.008
TPLUS6	.157	18	.200*
TPLUS7	.418	18	.000
ARRBEFORE	.178	18	.134
ARRAFTER	.230	18	.013

Hypothesis Testing

The difference in stock prices of healthcare companies before and after the first vaccine in Indonesia

Based on the results of the hypothesis test using the paired sample t-test presented in Table 8, it is known that there are differences in stock prices before and after the COVID-19 vaccine is implemented in Indonesia. This can be seen from the significance value of 0.043 which is below 0.05 indicating that the hypothesis in this study is significantly accepted.

Table 8. Paired Sample t-test

Paired Differences		Pair 1 before Vaccination - after Vaccination
Mean		110.922
Std. Deviation		546.277
Std. Error Mean		54.090
95% Confidance Interval of the	Lower	3.623
Difference	Upper	218.221
T		2.051
Df		101
Sig. (2-tailed)		.043

The difference in trading volume of healthcare companies before and after the first vaccine in Indonesia

The description of the Wilcoxon Signed-Rank Test results is presented in Table 9. According to Table 9, some inferences can be drawn as follows:

1. Negative ranks are the negative difference between stock trading volume before the COVID-19 vaccine and trading volume after the COVID-19 vaccine, with a total of 132 data. After the vaccine, the trading volume showed a negative number at the N value of 75, the Mean rank of 74.08, and the Sum of Ranks of 5556. This means that the trading volumes have decreased to 75 data.

2. Positive ranks are the positive difference between the results of stock trading volume before the COVID-19 vaccine and the trading volume after the COVID-19 vaccine of 57 data, which means there is an increase in trading volume in healthcare companies before the vaccine is administered in Indonesia.

3. Ties mean the similarity in the value of the stock trading volume of healthcare companies before and after the COVID-19 vaccine is carried out in Indonesia. The ties is 0, which means there is no equal value between the trading volume of the company's stocks before and after the COVID-19 vaccine.

Table 9. Wilcoxon Signed-Rank Test

		N	Mean Rank	Sum of Ranks
Before Vaccine – After Vaccine	Negative Ranks	75[a]	74.08	5556.00
	Positive Ranks	57[b]	56.53	3222.00
	Ties	0[c]		
	Total	132		

A. After Vaccine < Before Vaccine

B. After Vaccine > Before Vaccine

C. After Vaccine = Before Vaccine

The significant effect of the COVID-19 vaccine on the trading volume of the healthcare stocks can be seen in Table 10. The Wilcoxon test obtained 0.008, which is smaller than 0.05. This means that the second hypothesis is accepted that there are differences in the trading volume in the healthcare sector before and after the COVID-19 vaccine in Indonesia.

Table 10. Trading Volume of the Healthcare Stocks

	After Vaccine – Before Vaccine
Z	-2.651[b]
Asymp. Sig. (2-tailed)	.008

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Abnormal difference in return of healthcare companies before and after the first vaccine in Indonesia

The abnormal return used the Wilcoxon signed-rank test and paired t-test to find out the abnormal returns on each day of the study period. The test results are shown in Table 11.

Table 11. Hypothesis Test Results on Abnormal Returns

Data	Sig.	Conclusion	Test tools used
t-7	0.9590	There is no significant abnormal return	Uji Paired t-Test
t-6	0.3340	There is no significant abnormal return	Wilcoxon Signed Rank Test
t-5	0.8340	There is no significant abnormal return	Uji Paired t-Test
t-4	0.6160	There is no significant abnormal return	Uji Paired t-Test
t-3	0.5460	There is no significant abnormal return	Wilcoxon Signed Rank Test
t-2	0.0270	There is a significant abnormal return	Wilcoxon Signed Rank Test
t-1	0.2110	There is no significant abnormal return	Uji Paired t-Test
t-0	0.0000	There is a significant abnormal return	Uji Paired t-Test
t+1	0.0410	There is a significant abnormal return	Uji Paired t-Test
t+2	0.0070	There is a significant abnormal return	Uji Paired t-Test
t+3	0.0000	There is a significant abnormal return	Uji Paired t-Test
t+4	0.5690	There is no significant abnormal return	Uji Paired t-Test
t+5	0.1260	There is no significant abnormal return	Wilcoxon Signed Rank Test
t+6	0.4600	There is no significant abnormal return	Uji Paired t-Test
t+7	0.0070	There is a significant abnormal return	Wilcoxon Signed Rank Test

Table 11 shows that there is a significant abnormal return at t-2, t+1, t+2, t+3, and t+7 where each value is below 0.05. Abnormal return was also found significant in the average abnormal return of healthcare companies before and after the first vaccine in Indonesia. This is seen in Table 12 which shows a significant number of 0.003 which is below 0.05. Hence, hypothesis 3 is proven that there is an average abnormal return in healthcare companies before and after the announcement of the COVID-19 vaccine.

Table 12. Hypothesis Test Results on Average Abnormal Return (ARR)

	ARR after – ARR before
Z	-2.937[b]
Asymp. Sig. (2-tailed)	.003

The average abnormal return (ARR) during the study event period, when the abnormal return increased from t-6 by 0.04 to t-5, then declined to t-2 before increasing again by 0.08 before the COVID-19 vaccination was administered (see Figure 3). The opposite direction occurred after the implementation of the COVID-19 vaccine, which is seen that abnormal returns decreased from t-0 to -0.04 and dropped dramatically at t +7 which was -0.07.
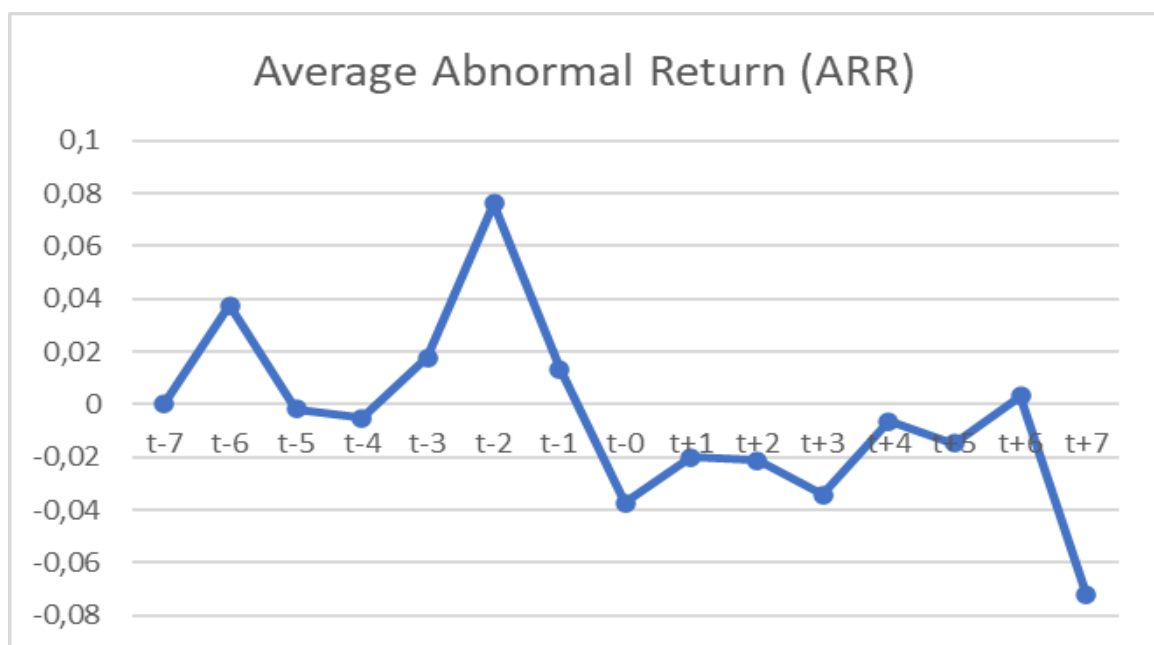

Figure 3. Average Abnormal Return (ARR)

Discussion

The difference in stock prices in Indonesia's healthcare stocks before and after the first vaccination was implemented on January 13, 2021, illustrates that there is a sentiment that the vaccine is given to investors' decisions to acquire stocks in the healthcare sector companies. The results of this study are supported by Welley et al. (2021) that the stock prices of KAEF and INAF have increased before and after the COVID-19 vaccine. Lathifah et al. (2021) explained that INAF and KAEF shares were able to survive during the pandemic and experienced an increase in stock prices even though they were affected by the large-scale social restrictions and domestic or foreign policies. Therefore, the vaccine has a positive impact on investors buying healthcare shares. This is since the fact that health-related businesses have a lot of clout during this pandemic.

The availability of vaccines sent a favorable signal to investors, who saw it as a means of averting a COVID-19 pandemic in Indonesia. The vaccine is one of several preventions of contracting the COVID-19 virus that can be done by the community in addition to wearing masks, washing hands, keeping distance, exercising, and consuming foods and drinks with vitamins. Various efforts have been made by both the government and the community to jointly reduce the spread of the COVID-19 virus and also prevent transmission. Therefore, various things that are sold related to these prevention efforts are also in high demand such as PPE (Personal Protective Equipment), masks, vitamins, medicines, supplementary drinks, swab test kits, and also vaccine injection equipment. Companies that sell these goods also get the impact of high public demand so that sales increase and profits also increase. This is also noticed by investors when purchasing stocks, particularly the future prospects of the Healthcare sector company, which is predicted to develop and perform better in the future because it is sorely needed by the community.

The difference in the trading volume of healthcare companies before and after the provision of the COVID-19 vaccine was because many investors were optimistic about the company's performance in the future, considering that cases of COVID-19 transmission were still increasing. As can be observed, 57 data points witnessed a rise in trade volume prior to the introduction of the vaccination in Indonesia. After the first vaccine was provided in Indonesia, this overconfidence faded, as evidenced by the 75 data points showing a fall in trading volume. This is due to excessive euphoria by investors, which peaked before the vaccination was administered and began to decrease the volume of transactions after the vaccine was administered.

The results of this study are supported by Nurmasari (2020), stating that the trading volume shows a considerable difference after the COVID-19 announcement, indicating a higher value. Tambunan (2020) explains that during the COVID-19 pandemic, sales volume and transaction value on the Indonesian stock exchange can provide advantages in stock investing, particularly in the consumer industry sector, the telecommunications sector (data, towers), and the health sector (pharmaceuticals and hospitals).

Abnormal returns were significantly found before and after the provision of the COVID-19 vaccine in the shares of healthcare companies. Significantly, abnormal returns also occurred for each period of study at t-2, t+1, t+2, t+3, and t+7. This means that there have been conditions where the market becomes inefficient because investors can obtain abnormal returns from information asymmetry. The average abnormal return (ARR) has increased before the COVID-19 vaccine was implemented precisely at t-2 and then decreased when the COVID-19 vaccine had been implemented at t-0 until the peak of the decline at t+7. The results showed that investors reacted positively to the vaccine announcement by increasing the performance of healthcare sector stocks, but this did not last long because investors began to sell their shares or take profits at the time of the stock price increase, causing abnormal returns to decline since the vaccine was implemented in t-0. The results of this study are supported by Liu et al., (2020), that countries in Asia

experienced abnormal returns in 21 leading sectors in major countries during the COVID-19 virus outbreak.

Conclusion

The provision of vaccines has an impact on stock prices in the healthcare sector as indicated by the average stock price of healthcare companies, which was originally 362.39 million before the vaccine and increased to 435.48 million after the vaccine administration in Indonesia. The difference in stock prices in the healthcare sector in Indonesia before and after the vaccine administration suggests that there is a belief that the vaccine influences investors' decisions to buy stocks in the healthcare sector. The difference in trading volume of healthcare companies before and after the COVID-19 vaccine was because many investors were optimistic about the future success of healthcare sector firms at the time of the vaccine's discovery in Indonesia. Abnormal returns were also found to occur before and after the COVID-19 vaccine was implemented in Indonesia. Abnormal returns during the study event are found at t-2, t +1, t +2, t +3, and t +7. This occurred as a result of investors reacting to news of the COVID-19 vaccination in Indonesia, which caused the stock price to rise.

In regards to the findings of this study, investors should pay greater attention to all market information, including, in this example, news about vaccines in Indonesia as a reference in making investment decisions, especially during a pandemic. Meanwhile, the government is expected to be able to provide valid and up-to-date information concerning all policies issued so that the public can obtain correct information and can use this information in making investment decisions. For future research, the researchers are encouraged to include companies from other industries that are also affected by the COVID-19 vaccine in Indonesia.

Authors' Declaration

The authors made substantial contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation, and discussion of results. The authors read and approved the final manuscript.

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