



The Impact of the Covid-19 Pandemic on Stock Prices and Stock Price Volatility in Agricultural Companies on the Indonesia Stock Exchange

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Abstract. The Covid-19 pandemic has had a tremendous impact on various aspects of life, including the fields of health, economy, industry, and agriculture in Indonesia. This study aims to analyze the impact of the Covid-19 pandemic on stock prices and stock price volatility in agricultural companies in Indonesia. The data used in this study is daily stock price data of agricultural companies listed on the Indonesian stock exchange from December 2019 to May 2020. To answer the research objectives, a paired sample t-test was conducted on stock prices and daily stock price volatility of agricultural companies before the Covid-19 pandemic (data from December 5, 2019 to March 1, 2020) compared to stock prices and daily stock price volatility of agricultural companies after the Indonesian government announced cases of Covid-19 (March 2, 2020 to May 31, 2020). The volatility of stock prices of agricultural companies is measured by following the approach taken by Parkinson (1980). The results of the analysis show that the Covid-19 pandemic has a negative and significant impact on stock prices of agricultural companies in Indonesia that is the average stock price of agricultural companies decreased by 34.01%. Furthermore, the results of the study also show that the Covid-19 pandemic has caused the dynamics of stock prices of agricultural companies in Indonesia to become more volatile. This provides an understanding that the COVID-19 pandemic has resulted in increased business risk for agricultural companies in Indonesia along with the dynamics of stock price movements.

Keywords: Stock Price · Price Volatility · Covid-19 · Agricultural Company

1 Introduction

Covid-19 first appeared in Wuhan, China, in December 2019. This virus attacks the respiratory tract and causes respiratory tract infections. In a relatively short time, this virus spread to various other regions in China, then to other countries. After almost 2 months of being an epidemic, the World Health Organization (WHO) on January 30,

2020 also declared a global emergency against the corona virus and declared a pandemic in March 2020 [1].

In Indonesia, the first case of Covid-19 was confirmed on March 2, 2020. As an effort to control, the government implemented a large-scale social policy (PSBB). Some of the PSSB policies that have been carried out are physical distancing, wearing masks, closing schools, doing work from home, temporarily closing potential gathering places such as malls and so on. The Covid-19 virus pandemic not only poses a threat to health but also has an impact on the economic growth of a country. It is estimated that global economic growth will experience a -3% recession [2]. The impact of the spread cannot be calculated with certainty, but the slowdown in the economic system has been felt, especially in the industrial, tourism, trade, transportation and investment sectors.

Pandemics caused by viruses do not only occur in cases of the spread of covid-19, but previously there have been cases of pandemics such as the SARS pandemic in 2002 and the EBOLA pandemic in 2014. Many studies have been conducted to analyze the impact of the SARS and EBOLA pandemics, one of them the other is how the impact of the SARS and EBOLA pandemics on stock price performance. The results of the study indicate that the SARS and EBOLA pandemics had a negative impact on stock prices [3–10].

The results of research conducted by [11] shows that there is a difference in joint stock prices on the Indonesia Stock Exchange between before and after the covid-19 pandemic. The results of research conducted by [11] are in line with other studies which show that after the announcement of the first case of Covid-19 in Indonesia, the JCI decreased significantly (almost 50%) from its initial value in December 2019 [12]. Other research, for example a case study at PT. Bank Mandiri Tbk and PT. Ramayana Lestari Sentosa Tbk shows that stock prices have also decreased after the Covid-19 case [2, 13].

Changes in stock prices are indicated by the volatility of stock prices due to the COVID-19 pandemic. Volatility has broad implications, for example related to business risk and investor interest in investing [14]. In the American market, for example, stock volatility increased from January to March from 0.278% to 0.984%, but then the stock price declined again in May 2020 to 0.382% [15]. These results indicate that the industrial sector in the United States has experienced a significantly increased risk due to the Covid-19 pandemic [16]. A high level of volatility results in a greater risk, namely the accuracy of stock price estimates is decreasing [17].

In general, it is known that stock price indices for fertilizer producers, agricultural chemicals and food distributors in the US, Japan and Europe show a high trend of increasing volatility [18]. Based on that issue, this research aimed to conduct a study to determine the impact of the Covid-19 pandemic on stock prices and stock price volatility, especially for agricultural companies in Indonesia.

2 Research Framework

The government announced the first case of covid-19 on March 2, 2020. Then on June 1, 2020 the government stated that it was called the New Normal Era. Therefore, the study of the impact of the COVID-19 pandemic uses data from the period 3 March to 31 May 2020 (for 57 days). As for the comparison data, the conditions where 57 days before the government announced the COVID-19 pandemic (Fig. 1).

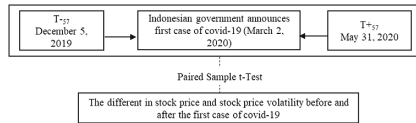


Fig. 1. Research framework

3 Research Methodology

This research was conducted using secondary data in the form of daily stock prices in agricultural companies listed on the Indonesia Stock Exchange (IDX) during the research period December 6, 2019 –May 31, 2020. The period December 6, 2019 to March 1, 2020 to represent conditions prior to the Covid-19 pandemic. While the period from March 3 to May 31, 2020 is to describe the condition of the impact of the occurrence of COVID-19 (the period before the New Normal Era). The sampling technique of agricultural companies was carried out using purposive sampling, with the criteria that the agricultural companies were not delisted during the research period. Stock price data is a composite stock price index of agricultural companies (closing price). The volatility of joint stock prices of agricultural companies is measured using the Parkinson's approach [19], namely:

$$PV = \sqrt{\frac{1}{n} \sum \ln\left(\frac{Ht}{Lt}\right)^2} \quad (1)$$

Description:

PV = Stock price volatility

Ht = The highest stock price in period t

Lt = The lowest stock price in period t

n = Number of observations

To test the impact of the COVID-19 pandemic on the joint stock price index of agricultural companies and stock price volatility, the paired sample t-test was used [20]. Paired Sample t-test in general is a parametric test to test hypotheses about the presence or absence of differences in variable values in 2 different time conditions (before and during the covid-19 pandemic). The formula used to calculate the t-count value is:

$$t = \frac{X1 - X2}{sd/\sqrt{n}} \quad (2)$$

Description:

X1 = Average stock prices (and stock volatility) before the Covid-19 pandemic

X2 = Average stock prices (and stock volatility) during the Covid-19 pandemic

sd = Sample standard deviation

n = Number of observations

The variables in this study are:

Y1.1: Stock price on December 6, 2019 to March 1, 2020 (before the government announced the first case of covid-19)

Y1.2: Stock price on March 3, 2020 to May 31, 2020 (after the government announced the first case of covid-19)

Y2.1: Stock price volatility on December 6, 2019 to March 1, 2020 (before the government announced the first case of covid-19)

Y2.2: Stock price volatility on March 3, 2020 to May 31, 2020 (after the government announced the first case of covid-19)

The first step is to determine the research hypothesis formula. This study uses a one-way test so that the research hypothesis is as follows:

Hypothesis 1: it is suspected that the stock price of agricultural companies listed on the IDX before the government announcement regarding the occurrence of the covid-19 case (December 6, 2019 – March 1, 2020) was greater than the stock price after the announcement of the first case of Covid-19 on March 2, 2020 (March 3, 2020 to May 31, 2020).

$$H_0 : Y_{1.1} \leq Y_{1.2}$$

$$H_1 : Y_{1.1} > Y_{1.2}$$

The testing criteria for the one-way hypothesis are:

If the significance value (p value/2) < (0.05) then H_0 is rejected and H_1 is accepted.

Hypothesis 2: It is suspected that the stock prices volatility of agricultural companies listed on the IDX prior to the government's announcement of the COVID-19 case (December 6, 2019 – March 1, 2020) was less than the stock price after the announcement of the first case of Covid-19 on March 2, 2020 (March 3, 2020 to may 31, 2020).

$$H_0 : Y_{2.1} \geq Y_{2.2}$$

$$H_1 : Y_{2.1} < Y_{2.2}$$

The testing criteria for the one-way hypothesis are:

If the significance value (p value/2) < (0.05) then H_0 is rejected and H_1 is accepted.

4 Results and Discussion

4.1 Differences in the Composite Stock Price Index of Agricultural Companies Before and After the Announcement of the First Case of Covid-19 in Indonesia

Overall, the average, maximum and minimum value of the composite stock price index (JCI) of agricultural companies before the Indonesian government announced the first case of covid-19 was greater than the composite stock price index of agricultural companies after the announcement of the first case of covid-19 in Indonesia. The data can be seen in Table 1.

In Table 1, it can be seen that the significance value (p-value = 0.00). This result shows that H_0 is rejected, meaning that the composite stock price index of agricultural companies before the government announced the first case of covid-19 was greater than the stock price after the announcement of the first case of covid-19. On average, the

Table 1. The results of the paired sample t-Test on the composite stock price index of agricultural companies in Indonesia

Variable		Sig value	
Y1.1	Composite stock price of agricultural companies before the announcement of the first case of covid-19 Mean (1,279.0044) Max (1,433.55) Min (1,036.9)	Y1.2	Composite stock price of agricultural companies after the announcement of the first of covid-19 Mean (844.0246) Max (1,089.9) Min (684.7)
		0.000* Composite stock price changes = 434.98 (-34.01%)	

Source: Data processed 2021

Note: *significance value < 0.05; change is the average change from variable 1 to 2

composite stock price index of agricultural companies decreased by 34.01% due to the Covid-19 pandemic.

The joint stock price index of agricultural companies decreased during the covid-19 pandemic, the results of this study are in line with other studies where there was a decline in the composite stock price index on the Indonesia Stock Exchange (IDX) during the covid-19 pandemic [11], and [12]. Not only in Indonesia, but the Chinese Stock Market also shows that the COVID-19 pandemic has had a negative impact on most industries, especially the mining and agriculture industries [21]. In the short-term, the COVID-19 pandemic has had a negative impact on the stock markets of countries affected by the pandemic such as the People's Republic of China, Italy, South Korea, France, Spain, Germany, Japan, and the United States [22].

4.2 Differences in Stock Price Volatility of Agricultural Companies Before and After the Announcement of the First Case of Covid-19 in Indonesia

The volatility of stock prices of agricultural companies as a whole has the average, maximum and minimum values before the announcement of the first Covid-19 case, which is less than the volatility of stock prices of agricultural companies after the announcement of the first case of COVID-19 in Indonesia. The data can be seen in Table 2.

In Table 2 it can be seen that the significance value (p -value = 0.00). This result shows that H_0 is rejected, meaning that the volatility of stock prices of agricultural companies before the announcement of the first Covid-19 case by the Indonesian government was less than the volatility of stock prices of agricultural companies after the Indonesian government announced the first case of COVID-19. On average, it can be seen that the volatility of share prices of agricultural companies increased by 38.60% due to the covid-19 pandemic.

The results of this study are in line with other studies showing that in the US stock market, volatility increases from January to March 2020 [15]. Other research results also show that the US and UK stock markets experienced increased volatility and peaked in March 2020 [23]. Stock markets in the US, Japan and Europe where agricultural

Table 2. The results of the paired sample t-Test on the composite stock price volatility of agricultural companies in Indonesia

Variable				Sig value
Y2.1	Composite stock price volatility of agricultural companies before the announcement of the first case of covid-19 Mean (0.03065) Max (0.07177) Min (0.01607)	Y2.2	Composite stock price volatility of agricultural companies before the announcement of the first case of covid-19 Mean (0.04248) Max (0.08462) Min (0.01930)	0.000* Composite stock price volatility changes = 0.01183 (38.60%)

Source: Data processed 2021

Note: *significance value < 0.05; change is the average change from variable 3 to 4

companies such as fertilizer manufacturers, agricultural chemicals and food distributors also show that the sector is experiencing high volatility [18].

A high level of volatility results in a greater risk, namely the decreasing accuracy of stock estimates [17]. With the stock market being more volatile, investors face more uncertain conditions than before the COVID-19 pandemic. In [22], states that the COVID-19 pandemic has caused shock, panic and concern among international investors.

Based on research conducted by [21] which states that the things that can overcome the adverse effects of the COVID-19 pandemic in China are a large economy, complete infrastructure and industrial chains, and strong supporting capabilities. By looking at the conditions in China that implement 5G networks for educational purposes, agricultural companies in Indonesia can improve by increasing marketing by utilizing startup applications. This is also supported by [13] where the increase in share sales transactions is not accompanied by stock prices so that the best strategy is to be more aggressive in selling online.

However, the majority of agricultural companies are plantations, especially oil palm plantations, so stabilizing the production process would be the right action. This is because the COVID-19 pandemic does not have a direct impact on the plantation industry. For agricultural companies engaged in other fields, with the pandemic, they may be able to take advantage of the online marketing system, which is expected to be more effective, increase sales turnover as much as possible and attract investors. With the pandemic, it can be an opportunity in itself because even small companies can compete with companies that already have a large market share before.

5 Conclusion

The results of the study show that the joint stock price index of agricultural companies has decreased after the COVID-19 pandemic. In other words, the COVID-19 pandemic has a negative impact on the composite stock price index. In addition, the results of the study also show that the Covid-19 pandemic has caused the dynamics of stock

prices of agricultural companies in Indonesia to become more volatile. This provides an understanding that the COVID-19 pandemic has resulted in the business risk being borne by investors in agricultural companies in Indonesia to increase in line with the dynamics of the movement of their stock prices.

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