The Volatility of Stock Market in Indonesia During Covid-19 Crisis: Evidence from Consumer Goods Industry

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ABSTRACT

This study aims to measure the volatility of stock in consumer goods industry. The analysis in this study utilize index value of consumer goods sectoral stock in 260 days. Using the paired t-test, it was discovered that stock index of consumer goods has significant change after the announcement of Covid-19 first case in Indonesia. The volatility of stock index was raised during the pandemic as measured from its standard deviation. Furthermore, the estimation of GARCH model revealed that consumer goods stock experienced a great volatility during Covid-19 crisis. The value of volatility persistence is 0.917 or close to 1, it means that the volatility was long-lasting as long as the economic crisis. The result of study could give the information for stock investor to be careful with their investment fund during the crisis. Meanwhile, the consumer goods companies can observe this result as consideration in determining the effective strategy in managing the company’s finances in the midst of an economic crisis.

Keywords: Consumer Goods, Covid-19, Economic Crisis, GARCH Model, Stock Market, Volatility
INTRODUCTION

The capital market, which includes stock products, grows as an investment mean for the societies. It aims to grow the value of its assets. The society can officially control several the ownerships of the company issuing the stocks as long as he or she purchases securities in the form of stock and acts as investor. The developed assets in the form of stocks also have the potential to provide profits from dividends that are obtained periodically or capital gains from the increase in the price of the stocks owned. The Indonesian Central Securities Depository (KSEI) revealed that the number of stock investors in 2022 was 4,440 accounts, growing 5 times in the last 5 years.

From the 825 companies listed on the Indonesia Stock Exchange (IDX), the number of outstanding stocks has already reached 9.7 trillion stocks. Since 1996, the IDX has divided these issuers into 9 business sectors, namely agriculture, mining, basic industry, miscellaneous industry, consumer goods, property, infrastructure & utilities, finance, trade & service. In 2020, the consumer goods sector has the second largest market capitalization of IDR 1,057 trillion or covers 15.16% of the total IDX market capitalization. The consumer goods sector also have contributed to Indonesia’s GDP of 9.89%. If it is viewed in accordance with the expenditure aspect, household consumption is the largest component in Indonesia’s GDP with a portion of 57.63%.

An inefficient capital market will harm a variety of stakeholders (Mukharomah, Nilmawati, & Kristanto, 2022). However, the capital market in Indonesia weakened in 2020 during the outbreak of the Covid-19 pandemic. This is evidenced by the market capitalization which decreased by 4.06% from the previous year. The Covid-19 pandemic has led to the Composite Stock Price Index (IHSG) to reach its lowest point of decline in the last decade. This incident occurred on March 24 2020 where the IHSG value decreased 37% from the beginning of the year to a level of 3,937. This decrease was accompanied by a drastic reduction in stock market capitalization reaching IDR 1,907 trillion. Covid-19 also triggered an economic crisis in Indonesia which was marked by an economic recession in the third quarter of 2020 and continued until the first quarter of 2021.

As an effect of the Covid-19 pandemic, the volume of stock transactions in 2020 decreased by 22.74% to 2.75 trillion stocks. This decline could not be separated from the behavior of investors who were more careful in investing in the midst of an economic crisis, especially since stocks are an investment product that is high risk-high return. The negative trend can also be seen in the interest of foreign investors in buying stocks on the Indonesia Stock Exchange. In 2020, the purchase value of foreign investors was only IDR 677 trillion, a decrease of 9.5% from the previous year, it recorded purchases from foreign investors of IDR 748 trillion. This fact shows that the stock market has experienced unstable performance during the Covid-19 crisis.

The aim of this study was to measure the volatility of consumer goods sector stocks during the Covid-19 crisis. Several previous studies have analyzed the performance of consumer goods stocks or stock volatility during economic crises. Sumantri (2020) examined the factors that affected the value of the consumer goods sector stock index, however, it does not include the crisis period as a crucial moment. Dang and Nguyen (2020) also analyzed stock performance during the 2008 global financial crisis, however, this study merely uses data per company without looking at value volatility on a sectoral scale. Alghifary, Kadji, and Hafizah (2023) measured IHSG volatility during the Covid-19 crisis. However, it did not specifically explain the conditions experienced by stocks in the consumer goods sector.

Whereas, this current study aims to fill the gap from previous research by focusing on measuring volatility in consumer goods sector stocks using the GARCH model estimation.
and using the Covid-19 crisis a crucial moment during this research. The finding of this current research will be useful for various interested parties in the capital market industry in Indonesia. For capital market regulators, this research can be used as a reference to evaluate policies implemented in maintaining capital market stability in Indonesia. Meanwhile for companies, especially those engaged in the consumption sector, the results of this study can be used as material for consideration in determining the right steps in managing the company’s finances in the midst of an economic crisis.

LITERATURE REVIEW

According to Hayes (2021), volatility is a statistical tool used to determine the level of movement and distribution of prices for a security product, or market index at a particular time. Nugroho and Robiyanto (2021) assert that the risk associated with investing in an asset increases with its level of volatility. Mamtha and Srinivasan (2016) add that high volatility occurs when there are significant price fluctuations within a short period, while low volatility occurs when the price movement is slow. Hence, volatility can function as a gauge of the stability of financial markets. In general, the variance or standard deviation of the data set of the price movement of an asset can be used to measure volatility.

According to Thampanya, Wu, Nasir, and Liu (2020), two main factors broadly influence stock price volatility: fundamental and behavioral factors. Fundamental factors are developed from conventional financial theory, under the presumption that investors adhere to the fundamental financial theories and design investment strategies based on calculations of risk and profit. On the other hand, behavioral factors emphasize that investors are ordinary people who are easily influenced by sentiment and psychological circumstances. Therefore, investment decisions are often made based on the good or bad news that circulates, rather than following fundamental financial theories.

Fundamental factors encompass objective indicators that can be quantitatively measured and unbiased, for instance macroeconomic variables like inflation rates, interest rates, exchange rates, and GDP (Francis & Soffer, 1997), as well as corporate financial ratios like ROA (Return on Assets), ROE (Return on Equity), and cash flow (Chang & Dong, 2006). Conversely, various studies have also demonstrated that behavioral factors impact stock volatility through investor sentiment that is driven by their perceptions of future conditions (Baker & Wurgler, 2007). According to the capital market behavior theory, when bullish sentiment is dominated in the market, investors will buy more stocks and asset prices will be pushed above their intrinsic value. In contrast, when bearish sentiment dominates, investors tend to sell their stocks or hold onto them, resulting in prices being pulled down below their fundamental value (Shefrin & Statman, 1994).

Several studies have explored how the economic crisis has affected the volatility of stocks. Chebbi, Ammer, and Hameed (2021) investigated the state of stock liquidity for S&P 500 companies during the COVID-19 pandemic-triggered economic crisis. The S&P 500 index includes the 500 largest publicly traded corporations in the United States by market capitalization. The research’s conclusions showed an inverse relationship between COVID-19 cases and firm liquidity, indicating that an increase in daily COVID-19 cases led to a decrease in company liquidity. Additionally, Li, Zhuang, Wang, and Dong (2021) conducted a comprehensive analysis of the connection between the COVID-19 pandemic and the stock market in G20 member nations. The research found that during the COVID-19 crisis, there was a considerable rise in the volatility correlation between stock markets in G20 member countries. The linkage of this volatility is mainly transmitted by the stock markets of developed countries, which affect the stock markets of developing countries.
Specifically in Indonesia, Haryanto (2020) evaluated the correlation between the number of COVID-19 cases and the IHSG value. The research's findings using multiple linear regression analysis techniques revealed a significant negative effect of COVID-19 cases on the IHSG value. As a result, every 1% rise in COVID-19 cases would result in a 0.03% reduction in the IHSG's value. Dewi, Anggraeni, and Irawan (2023) also examine the stock market volatility in Indonesia, particularly during the Covid-19 pandemic. By utilizing the EGARCH model, their study indicated that economic shocks significantly affect on stock returns during the pandemic. The impact of shocks during the COVID-19 pandemic resulted in greater stock volatility than in previous crises. Furthermore, the net foreign inflow of investors also affected the volatility of returns.

In addition to the Covid-19 pandemic crisis, there have been numerous prior investigations into stock market conditions during the previous economic crisis. Dang and Nguyen (2020) conducted research on 17,493 companies from 41 countries during the 2008-2009 global financial crisis to study the correlation between liquidity risk and stock performance. The study discovered that when there was a liquidity shock on global financial markets during the crisis, stocks that generated greater profits before the crisis experienced more significant price declines. Rafiq (2022) has also examined the impact of some crises on stock prices since 1870. The research demonstrated that the financial recession followed by the disaster had the most damaging impact on the downturn of stock prices. The findings provided an explanation for why stock prices decline right away after financial shocks.

RESEARCH METHOD

This research utilized time-series data. The time-series dataset used in the study comprised of daily stock prices of the consumer goods industry. Data on stock price movement was obtained from the official portal of the Indonesia Stock Exchange (IDX). The sectoral index values at the stock exchange's closing on that day, in accordance with the stock exchange's operation hours, are referred as the daily stock price. The study employed daily stock prices to compare the performance of stocks in 30 days before and after the official announcement by the government regarding the first COVID-19 case. In addition, the study used daily stock price data to quantify volatility during the pandemic from March 2020, when the first COVID-19 case was detected in Indonesia, to March 2021, covering a total period of 260 days.

If the sample data are regularly distributed, a paired t-test can be used for comparative analysis. Therefore, it is essential to test for normality before performing any comparative tests. The software SPSS was used in this study to carry out the comparative test. On the other hand, the most appropriate analytical method for measuring the volatility of a variable is the GARCH (Generalized Auto Regressive Conditional Heteroskedasticity) model (Enders, 2004), which takes into account heteroscedasticity elements in different time series. Several previous studies have examined stock volatility using the GARCH model, such as Aliyev, Ajayi, and Gasim (2020); Azakia, Supandi, Ramadhan, and Dani (2020); Mhd Ruslan and Mokhtar (2021); Naik, Mohan, and Jha (2020); and Nurdany, Ibrahim, and Romadoni (2021). The study will estimate the GARCH model using the EViews software.

Time series data in the financial sector, such as stock prices, are prone to volatility clustering. If there is relatively high data variability at one time, the same trend will occur in the next period. Residuals from stock price data often have a fat-tailed distribution, indicating that there is a higher tendency for extreme events to occur during certain periods. Based on that, The GARCH model is suitable for analyzing data variance (Enders, 2004). Bollerslev (1986) introduced the GARCH model of the simplest equation as follows:
\[ \sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \]

That model is a variance equation that expresses the conditional variance \( \sigma_t \) at time \( t \) not only depends on the square of the error in the previous period but also the conditional variance in the prior period (Gujarati, 2004). The \( \alpha \) and \( \beta \) coefficients derived from the GARCH estimation will be added up to quantify the level of stock volatility.

**RESULTS**

The existence of the Covid-19 pandemic has certainly affected the economic movement of the country, including the stock market. If we compared the 30 days before and after the first Covid-19 case appeared in Indonesia, it was seen that the movement of the consumer goods stock index experienced a negative trend. The index value was still at 2,083 30 days before the emergence of Covid-19 cases. However, this value decreased to 1,746 after 30 days of the first case. The lowest value was 1,376 on March 19, 2020, which is the 18th day after the Covid-19 case was discovered in Indonesia.

**Figure 1.** Index Value of Consumer Goods Industry Before and After the Detection of COVID-19 First Case

Based on Figure 2, it can be seen that the value of the consumer goods sector stock index has a downward trend when the Covid-19 virus began to spread in Indonesia. To reveal more detailed information, the researchers grouped the data into two groups, namely data before and after the entry of the Covid-19 virus. The two data groups are compared to see the average index value and its volatility in two different periods. This is to clarify the impact of Covid-19 on the value of the stock index in Indonesia.
Table 1. Descriptive Statistics

<table>
<thead>
<tr>
<th>Stock Index Value</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before The Detection of Covid-19 First Case</td>
<td>30</td>
<td>1961.40</td>
<td>85.45</td>
<td>15.60</td>
</tr>
<tr>
<td>After The Detection of Covid-19 First Case</td>
<td>30</td>
<td>1657.52</td>
<td>132.87</td>
<td>24.26</td>
</tr>
</tbody>
</table>

Source: SPSS

Based on the table 1, the discovery of the Covid-19 case caused a decrease in the average value of the consumer goods sector stock index within 30 days. It was noted that the average index value fell 15.49% from 1,961 before the discovery of cases to 1,657 after the entry of Covid-19 cases in Indonesia. The data contained in the table above can also be used to see the volatility that occurs in consumer goods sector stocks based on the standard deviation value. If measured based on the percentage change in value, the volatility of stocks in the consumer goods sector increased by 55.49% from before the spread of the Covid-19 virus.

To validate that the change in value was caused by the discovery of the Covid-19 case, it is necessary to do a different test by comparing the group of stock index values between before and after the spread of the Covid-19 virus. Before carrying out a different test, the data is tested first to detect the normality of the data as a determinant of the different test method to be carried out. Because the number of samples exceeds 50 data, the normality test method used is the Kolmogorov-Smirnov (Raharjo, 2021).

Table 2. Normality Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Test Statistic</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Goods Sector Stock Index</td>
<td>60</td>
<td>1809.46</td>
<td>189.06</td>
<td>0.104</td>
<td>0.169</td>
</tr>
</tbody>
</table>

Source: SPSS

Based on the normality test output in Table 2, it can be seen that a significance value of >0.05 is found in the stock index value variable. Therefore, it can be concluded that the data is normally distributed and the Paired T-Test can be used to carry out comparative analysis. This test was conducted to identify the effect of the discovery of the Covid-19 case on changes in the value of the stock index for the consumer goods sector. If the test results show a significant difference, it is concluded that changes in the value of the stock index can occur due to the spread of the Covid-19 case.

Table 3. Paired T-Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Goods Sector Stock Index</td>
<td>10.908</td>
<td>29</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Source: SPSS

From the test output in Table 3, significance for the consumer goods sector stock index shows a value of <0.05 based on Paired T-Test result. From these results it can be
concluded that the stock index value of the consumer goods sector experienced a significant difference between before and after the discovery of the Covid-19 case. Because the results of the comparative analysis show a significant value, stocks in the consumer goods sector are considered to have unstable performance due to Covid-19.

Comparative analysis showing significant results is an early indication that consumer goods sector stocks experienced high volatility during the Covid-19 crisis. To review further, the researchers made an estimate using the GARCH model to measure the volatility that occurs in the consumer goods sector stock index (JKCONS). In the GARCH model, most of the previous studies used data of return stock as the observed variable (Azakia et al., 2020; Mhd Ruslan & Mokhtar, 2021; Nurdany et al., 2021). To get the return value of stock index, the stock value data is first transformed into natural logarithms in a first order differential equation (Aliyev et al., 2020; Rosadi, 2012).

**Figure 2. Volatility of JKCONS Return**

![Graph showing volatility of JKCONS Return]

Source: EViews

From the figure 2, it can be seen that the JKCONS index returns experience continuous volatility. A change in the high rate of return will be followed by a high change afterwards. The same thing happened to the volatility of stock returns with a low level of change. This condition is known as volatility clustering which is one of the data characters that is heteroscedastic and needs to be analyzed using the GARCH model (Enders, 2004). Stationary and heteroscedastic data is a requirement for estimating using the GARCH model. Therefore, the JKCONS index return data needs to go through the stationarity test and the heteroscedasticity test first.

**Table 4. Stationarity Test Result**

<table>
<thead>
<tr>
<th>Test</th>
<th>t-Statistic</th>
<th>Prob.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Augmented Dickey-Fuller test statistic</td>
<td>-17.56089</td>
<td>0.0000</td>
</tr>
<tr>
<td>Test critical values:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% level</td>
<td>-3.976629</td>
<td></td>
</tr>
<tr>
<td>5% level</td>
<td>-3.418889</td>
<td></td>
</tr>
<tr>
<td>10% level</td>
<td>-3.131986</td>
<td></td>
</tr>
</tbody>
</table>

Source: EViews
Table 5. Heteroscedasticity Test Result

<table>
<thead>
<tr>
<th></th>
<th>Value</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>27.0102</td>
<td>0.0000</td>
</tr>
<tr>
<td>Obs*R-squared</td>
<td>24.6232</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: EViews

The results of the two tests in table 4 and 5 show the Prob is 0.00 or lower than 0.05, so it can be concluded that the JKCONS index data returns meet the assumptions of stationarity and heteroscedasticity. Therefore, it can be determined that the next step is that the observed data needs to be estimated using the GARCH model to measure the amount of volatility that occurs. The estimation of the GARCH model will produce output in two forms of the equation, namely mean equation and variance equation. Mean equation describes how great is the average return of current stock is affected by return in the previous period. Whereas variance equation explains how great is the volatility persistence of the stock index determined by the volatility and squared error in the previous period.

Table 6. GARCH Model Estimation

<table>
<thead>
<tr>
<th>Variable</th>
<th>R_JKCONS</th>
<th>Coefficient</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Equation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>0.037745</td>
<td>0.0313</td>
</tr>
<tr>
<td>R_JKCONS(-1)</td>
<td></td>
<td>-2.08E-05</td>
<td>0.0304</td>
</tr>
<tr>
<td>Variance Equation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C (ω)</td>
<td></td>
<td>1.32E-05</td>
<td>0.0031</td>
</tr>
<tr>
<td>RESID(-1)^2 (α)</td>
<td></td>
<td>0.140146</td>
<td>0.0049</td>
</tr>
<tr>
<td>GARCH(-1) (β)</td>
<td></td>
<td>0.777169</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: EViews

The estimation in table 6 was carried out using the GARCH model (1,1). All independent variables in the estimated output have a significant influence because they show the Prob value. less than 0.05. The constant value also shows a value > 0 and the sum of the coefficients of the independent variables shows a value < 1. Therefore, this model is considered good for estimating the volatility of JKCONS returns. The sum of the coefficients α+β is a measure of volatility persistence contained in each stock index studied (Campbell, Lo, & MacKinlay, 2012). From the equation formed, it can be seen that the volatility persistence of the JKCONS index is in the range of 0.9172. Because the resulting numbers are very close to 1, it can be concluded that this index has high volatility during the Covid-19 pandemic in Indonesia.

DISCUSSION

The results of this study are in line with the findings of Curto and Serrasqueiro (2022) who stated that stocks in the American consumer goods sector, which are part of the S&P 500 index, experienced an increase in volatility since the Covid-19 virus started to spread in February 2020. According to the research, the increase in volatility happened due to the decrease in purchasing power and restrictions on social activities. The United States, as one of Indonesia’s largest economic partners, can create a contagion effect during an economic crisis marked by increased volatility (Nurfaiz & Chalid, 2022). Therefore, it is not surprising that stocks in the consumer goods sector in Indonesia...
experienced high volatility during the Covid-19 crisis because similar stocks in the United States also experienced similar problems.

The increase in volatility in stock price is also closely related to the increase in the number of Covid-19 cases in a country (Aloui, Asadov, Al-kayed, Hkiri, & Danila, 2022). Since it was first discovered on March 2, 2020, the detected number of Covid-19 cases has consistently increased every day in Indonesia. The peak occurred in January-February 2021 when the number of positive cases reached more than 10,000 per day before the appearance of new variants. Stock market volatility is also influenced by the country's macroeconomic conditions as a fundamental factor (Thampanya et al., 2020). During the Covid-19 pandemic, Indonesia experienced an economic crisis marked by negative growth in national GDP. Indonesia just managed to experience positive growth in the second quarter of 2021 after facing an economic recession in the third quarter of 2020.

CONCLUSION

Covid-19 pandemic caused to the economic crisis in various sectors including financial market. The crisis was followed by the reduction of society’s purchasing power. This condition led to instability and great volatility in stock value of consumer goods industry. Based on comparative analysis with paired t-test method, it was discovered that consumer goods stock index experienced a significant different in its value between before and after the detection of Covid-19 first case in Indonesia. This result was confirmed by the estimation of GARCH model that measure how great is the volatility of consumer goods stock index. From the result of estimation, it can be concluded that consumer goods stock index had great volatility during the Covid-19 pandemic in Indonesia. The volatility of stock market was long-lasting as long as the economic crisis.

The finding of this current research will be useful for various interested parties in the capital market industry in Indonesia. For capital market regulators, this research can be used as a reference to evaluate policies implemented in maintaining capital market stability in Indonesia. The result of study also could give the information for stock investor to be careful with their investment fund during the crisis. Meanwhile for companies, especially those engaged in the consumption sector, the results of this study can be used as material for consideration in determining the right steps in managing the company’s finances in the midst of an economic crisis.

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DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interest

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