OIL AND GOLD PRICE VOLATILITY ON INDONESIAN STOCK MARKET IN THE PERIOD OF COVID-19 PANDEMIC

Maria Magdalena Marwanti[1], Robiyanto Robiyanto[2*]
[1,2]Universitas Kristen Satya Wacana, Indonesia
Email: [1]212017064@student.uksw.edu, [2*]robiyanto.robiyanto@uksw.edu
[*]Corresponding author

Abstract

The study aimed to analyze the effects of oil and gold price volatility on stock returns in Indonesia by comparing the period before and during the Covid-19 pandemic. The study took secondary data from the daily closing prices of oil (Brent and WTI), gold, and JCI. The analysis technique used was GARCH (1,1). The study found that oil and gold price volatility did not affect stock returns in the two periods. The impact of the Covid-19 pandemic on financial markets had yielded uncertain results. This finding supported the concept of gold as a safe haven during the financial crisis. The limitations in the study were focusing on the Indonesian capital market, and future research can compare the impact of the Covid-19 pandemic on developing countries with developed countries.

Keywords: Oil price, gold price, volatility, covid-19, GARCH.

Introduction

The commodity market is an investment alternative that the investors can choose other than stocks, mutual funds, and bonds. As an investment, it can influence the price in the capital market and the return that the investors will receive. Oil and gold are examples of commodity markets, which most investors like to invest in. In making investment decisions, they must consider the volatility. The higher the volatility, the more rapid the price change, including it rises or falls, and the higher risks to receive. However, some investors are interested in investments with high volatility because the high volatility can bring commensurate opportunities for gaining a high return, or it is usually called high-risk high-return (high-risk high-return) (Syahri & Robiyanto, 2020).

Dynamic market conditions cause a high risk of investing. Oil is one of the most traded commodities considered to have high risk. Because of the high demand for oil for global industries, seeing all global industries need fuel, hence the fluctuating oil price movements can affect the capital market (Putra & Robiyanto, 2019). West Texas Intermediate (WTI) and Brent North Sea as the international oil benchmarks are examples of oil's effect on the capital market. Besides, gold is also one of the most traded commodities. In several countries, gold is used as a financial standard (Robiyanto, 2018c). The advantages of gold as an investment instrument are: not affected by inflation, high levels of liquidity, and no intervention in pricing by the government (Putra & Robiyanto, 2019).

The Covid-19 pandemic influences the global economy, not at least Indonesia. It is concerned for Indonesia during the Covid-19 pandemic because it will negatively affect the Indonesian economy, and also the investors will try to shift their investment to the safest assets (safe-haven) such as gold or other commodities. The Covid-19 pandemic made JCI tend to decline.

The price of gold tends to increase compared to the oil price decline during the Covid-19 pandemic. It means that the investors tend to shift their assets to gold commodity because it has low volatility and is considered the safest asset or safe haven (Kumar & Sahadudheen, 2015). With the low volatility and the safest asset, the risk of gold investment tends to be more stable. Research conducted by Bampinas and Panagiotidis (2015) and Hoang, Lahiani, and Heller (2016) prove that gold can be used as a hedge. Robiyanto, Wahyudi, and Pangestuti (2017); Robiyanto (2018a) support the statement by mentioning categorized gold as a safe haven in several countries. Also, Alali (2020) states that gold is considered a safe haven by seeing the price change of gold that tends to rise compared to stocks or other commodities during Covid-19.

The price change does not only cause the volatility happening but also causes the changes in returns that the investors will receive. Robiyanto (2018b) shows that the correlation of changes in global oil price with ASEAN stock market returns changes according to the stock market and commodity markets. The result found by Shabbir, Kousar, and Batool (2019) shows that the price of gold and oil has a significant influence on the stock market. Raza, Jawad, Shahzad, Kumar, and Shahbaz (2016) stated that an unstable economy is caused by the vulnerable stock market in developing countries to bad news.

There have many studies about price volatility, such as the research conducted by Raza *et al.* (2016) and Luo and Qin (2016). However, the research on price volatility during the pandemic is still rare, including the price volatility comparison during the pandemic and before the pandemic. Also, this study uses daily data according to the dynamic market.

The purpose of the study is to determine the effects of oil and gold price volatility on stock returns by comparing the period before the Covid-19 pandemic (January 2019–December 2019) and during the Covid-19 pandemic (January 2020–October 2020). The results of the study hopefully can be functional for the investors in making decisions to invest in facing other economic recessions in the future and contribute to previous literature.

Oil Price Volatility

As the international oil benchmarks, West Texas Intermediate and Brent North Sea dominate the oil futures market. As one of the traded commodities, the unstable changes in oil price and the high value can influence the stock market. Zhou, Jiang, Liu, Lin, and Liu (2018) state that there is a minor possibility to show immense losses or gains in the stock market when oil volatility is low (the quartile is lower than 0.1), however, there is also a high probability to show the immense losses and gains in the stock market when oil volatility is high (the quartile is higher than 0.9).

According to Zhou *et al.* (2018), several studies assume that unstable oil price volatility has a crucial impact on the stock market because crude oil is a commodity distributed to all global industries. The oil price volatility causes changes in macroeconomic policies that affect the stock market. Otherwise, oil has high liquidity that can protect the stock market risk. Noor and Dutta (2017) agree with their statements that empirical research of the relation between oil and the stock market is so valuable because oil is the primary indicator of the economy, so the changes in volatility that occur will have crucial impacts on the stock market.

Gold Price Volatility

The supply and demand for gold in global production and consumption becomes a benchmark in determining the gold price (Aditya, Sinaga, & Maulana, 2018). During economic instability, the rise of gold prices and the attention of gold as a safe haven causes the equity prices to fall (Arfaoui & Ben Rejeb, 2017). Volatility is considered an indicator of risk.

High volatility has the opportunity to get profit or loss with a high amount because prices are difficult to predict (Syahri & Robiyanto, 2020). As an investment instrument, gold volatility tends to be more stable than other investments because gold is a safe haven. It can be said that the risk of investing in gold tends to be lower.

Hypotheses Development

According to Hersugondo, Robiyanto, Wahyudi, and Muharam (2015), the increase in oil price has different effects on oil-exporting and importing countries. Their study found that the oil price changes (WTI) have significant positive impacts on KLCI and SET returns. Shabbir *et al.* (2019) state that the price of oil has a significant effect on stock market returns. Research conducted by Cevik, Cevik, and Dibooglu (2020) proves that the price of crude oil (Brent) has a significant effect on the return of the Turkish stock market where Brent oil is commonly used. Igbinova and Igbinova (2019) stated that the volatility of oil prices has insignificant positive effects on Nigeria's stock market returns in the short and long term. The causal relationship of oil price volatility causes unidirectional stock market returns.

Raza *et al.* (2016) found that oil price and oil price volatility negatively affect all stock markets of developing countries in the short and long term. However, the research conducted by Luo and Qin (2016) stated that oil price shocks have positive effects on China's stock returns, but the oil price volatility negatively affects the stock market.

This study uses WTI and Brent oil because use two international oils will produce more accurate results, as research conducted by Benedetto, Mastroeni, Quaresima, and Vellucci (2020) chose to analyze the relationship between Brent oil and OVX. After all, OVX is considered as a proxy for investor sentiment about the WTI oil market only.

The hypotheses are formulated as below:

H_1: WTI oil price volatility has a negative effect on stock returns

H_{1a}: WTI oil price volatility has a negative effect on stock returns before the Covid-19 pandemic

H_{1b}: WTI oil price volatility has a negative effect on stock returns during the Covid-19 pandemic

H_2: Brent oil price volatility has a negative effect on stock returns

H_{2a}: Brent oil price volatility has a negative effect on stock returns before the Covid-19 pandemic

H_{2b}: Brent oil price volatility has a negative effect on stock returns during the Covid-19 pandemic

The increase of the gold price from year to year could affect the JCI due to the minimal risk of investing in gold (Syahri & Robiyanto, 2020). This situation causes the investors to switch their assets to gold commodities. Bhuyan and Dash (2018) found a long-term relationship between gold and return, but there is no relationship between gold and return in the short term.

Previous research conducted by Raza *et al.* (2016) shows that the price of gold has positive effects on stock market prices in BRICS countries (Brazil, Russia, India, China, South Africa) but has negative impacts on stock markets in Mexico, Malaysia, Thailand, Chile, and Indonesia. Thus, the different effects may be due to the currency market, economic growth rates, interest rates, and inflation. Gold volatility negatively affects all stock markets in developing countries for the long and short term. Research conducted by Ali *et al.* (2020) states that the gold price volatility negatively impacts the stock market performance because the gold price volatility is considered an adverse indicator of the stock market.

The hypotheses are formulated as below:
H_3: Gold price volatility has a negative effect on stock returns
H_{3a}: Gold price volatility has a negative effect on stock returns before the Covid-19 pandemic
H_{3b}: Gold price volatility has a negative effect on stock returns during the Covid-19 pandemic

Research Method

This study takes secondary data from the daily closing prices of oil (WTI and Brent), gold, and JCI from January 2019 to October 2020, which happened before and during the Covid-19 pandemic. The data was obtained from www.investing.com. The dependent variable in this study is stock returns, while the independent variables used are oil price volatility and gold price volatility.

The calculation of stock market returns as measured from the JCI returns can be calculated using the equation:

$$RJCI_t = \frac{JCI_t - JCI_{t-1}}{IHSG_{t-1}} \qquad (1)$$

Where, $RJCI_t$ = JCI stock return at t-day; JCI_t = JCI on the day t; JCI_{t-1} = JCI on the day t-1.

The West Texas Intermediate (WTI) oil return calculation can be calculated using the equation:

$$RWTI_t = \frac{WTI_t - WTI_{t-1}}{WTI_{t-1}} \qquad (2)$$

Where, WTI_t = WTI price on the day t; WTI_{t-1} = WTI price on the day t-1.

The calculation of the return for Brent North Sea can be calculated using the equation:

$$RBrent_t = \frac{Brent_t - Brent_{t-1}}{Brent_{t-1}} \qquad (3)$$

Where, $Brent_t$ = Brent price on the day t; $Brent_{t-1}$ = Brent price on the day t-1.

The calculation of the return on gold can be calculated using the equation:

$$RGold_t = \frac{Gold_t - Gold_{t-1}}{Gold_{t-1}} \qquad (4)$$

Where, $Gold_t$ = gold price on the day t; $Gold_{t-1}$ = gold price on the day t-1.

The calculation of volatility for each commodity which is the independent variable can be calculated using the equation:

$$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i \in_{t-1}^2 + \sum_{j=1}^{p} \beta_i \sigma_{t-j}^2 \qquad (5)$$

Where, h_t = conditional variance; $\alpha_i \in_{t-1}^2$ = the volatility of the ARCH component; $\beta_i \sigma_{t-j}^2$ = volatility of the GARCH component.

Technique of Analysis

The study applies the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) technique by Bollerslev (1986). According to Posedel (2005), the GARCH (1,1) model is a suitable technique for this study as one of the reasons why the study uses the GARCH (1,1) model. The stationary test using the Augmented Dickey-Fuller Test is applied before the GARCH (1,1) test to ensure the data is stationarity. Previous researchers Hersugondo *et al.* (2015), Robiyanto (2017), and Robiyanto, Susanto, and Ernayani (2019) also use the GARCH (1,1) model in their research.

The equation used to see the effect volatility of West Texas Intermediate (WTI) oil and gold on stock market returns is as follows:

$$R_t = \alpha + \beta_1 VWTI + \beta_2 VGold + \varepsilon t \qquad (6)$$

With:

$$\varepsilon_t = \Phi t\, \varepsilon_{t-1} + \dots + \Phi t\, \varepsilon_{t-p} + \eta_t \qquad (7)$$

$$\eta_t = \sigma_t \varepsilon_t \qquad (8)$$

$$\sigma^2 t = \alpha_0 + \alpha_1 \eta_{t-1}^2 + \dots + \alpha_p \eta_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_q \sigma_{t-q}^2 \qquad (9)$$

The equation used to see the effect of the volatility of Brent North Sea oil and gold on stock market returns is as follows:

$$R_t = \alpha + \beta_1 VBrent + \beta_2 VGold + \varepsilon t \qquad (10)$$

With:

$$\varepsilon_t = \Phi t\, \varepsilon_{t-1} + \dots + \Phi t\, \varepsilon_{t-p} + \eta_t \qquad (11)$$

$$\eta_t = \sigma_t \varepsilon_t \qquad (12)$$

$$\sigma^2 t = \alpha_0 + \alpha_1 \eta_{t-1}^2 + \dots + \alpha_p \eta_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_q \sigma_{t-q}^2 \qquad (13)$$

Result and Discussion

The data stationarity test is applied using the Augmented Dickey-Fuller Test with a significance level of 1% (0.01). It is significant to test the data stationarity before applying the GARCH test to the research. When the probability value is less than the significant level, it means that the data is accepted and can perform the GARCH test. Table 1 shows the results of the data stationarity test. The probability value of each variable in the period column: before the pandemic, during the pandemic, and overall, it shows 0.0000. It means the data is accepted.

The normality test uses the Jarque-Bera value applied to see whether the data distributed normally or not, so it can determine the suitable GARCH distribution. There are two kinds of GARCH distribution: Gaussian (normal distribution) and Generalized Error Distribution (GED). If the data is a normal distribution, it must apply Gaussian. If it is not a normal distribution, it must use Generalized Error Distribution (GED). Table 2 shows the result of normality testing.

Table 1
Data Stationarity Test Result

Period	Variable	t-statistic	Prob.
Before Covid-19	R JCI	-14.7391	0.0000***
	R Brent	-16.8257	0.0000***
	R WTI	-16.9669	0.0000***
	R Gold	-17.2611	0.0000***
During Covid-19	R JCI	-13.1680	0.0000***
	R Brent	-12.3357	0.0000***
	R WTI	-10.4659	0.0000***
	R Gold	-12.5888	0.0000***
Combination	R JCI	-10.6264	0.0000***
	R Brent	-19.0821	0.0000***
	R WTI	-15.5825	0.0000***
	R Gold	-20.4145	0.0000***

***significant at the level of 1% significance

Table 2
Normality Test Result

Variables	Period	Jarque-Bera	Prob.
JCI, *Brent*, and Gold return	Before	3.6691	0.1597***
	During	11.8640	0.0027**
	Combination	55.7860	0.0000**
JCI, WTI, and Gold return	Before	3.3452	0.1878***
	During	19.3790	0.0001**
	Combination	58.5950	0.0000**
JCI return, Brent and Gold volatility	Before	4.3927	0.1112***
	During	24.5010	0.0000**
	Combination	58.5300	0.0000**
JCI return, WTI, and Gold volatility	Before	5.1381	0.0766***
	During	21.5990	0.0000**
	Combination	59.3040	0.0000**
JCI, *Brent*, and Gold volatility	Before	254.5900	0.0000**
	During	379.4200	0.0000**
	Combination	7083.4000	0.0000**
JCI, WTI, and Gold volatility	Before	246.6300	0.0000**
	During	1034.3000	0.0000**
	Combination	2774.3000	0.0000**

***Normally distributed (Gaussian)
**Not normally distributed (GED)

Table 3 is the GARCH (1,1) test result of the volatility of WTI oil and gold effects on stock returns. The probability value of GARCH during the pandemic is greater than the significance level (5%), which indicates that the data does not follow the GARCH pattern, while the probability value of GARCH before the pandemic is lower than the significance level (5%) which means the data following the GARCH pattern. In each period, the probability value of each independent variable is greater than the significance level (1%, 5%, 10%). The result proves that the volatility of WTI oil and gold has no significant effect on stock returns in each period.

Table 4 is the GARCH (1,1) test result to see the effects of the volatility of Brent oil and gold on stock returns. The probability value of GARCH in each period is lower than the significance level (5%), which means the data following the GARCH pattern. The result proves that the volatility of Brent oil and gold also has no significant effect on stock returns in each period because the probability value of each independent variable is greater than the significance level (1%, 5%, 10%).

Table 5 is the GARCH (1,1) test result of the WTI oil and gold return effects on stock return. The probability value of GARCH in each period is lower than the significance level (5%), which means the data following the GARCH pattern. In each period, the probability value of each independent variable is greater than the significance level (1%, 5%, 10%). The result proves that the WTI oil and gold return has no significant effect on stock returns in each period.

Table 3
The Effect of WTI and Gold Price Volatility on Stock Return in Indonesia

Period	Independent Variable	z-statistic	Prob.
Before Covid-19	C	-0.7417	0.4583
	V WTI	0.5612	0.5747
	V Gold	0.6238	0.5328
	C	0.6532	0.5136
	Resid	0.7927	0.4280
	GARCH	2.4405	0.0147**
During Covid-19	C	-0.0266	0.9788
	V WTI	-0.0332	0.9735
	V Gold	0.0178	0.9858
	C	0.7559	0.4497
	Resid	0.5365	0.5916
	GARCH	1.1934	0.2327
Combination	C	-0.7847	0.4326
	V WTI	0.1845	0.8536
	V Gold	0.8180	0.4133
	C	2.1841	0.0290
	Resid	3.3868	0.0007
	GARCH	11.4386	0.0000***

***significant at the level of 1% significance
**significant at the level of 5% significance

Table 4
The Effect of Brent and Gold Price Volatility on Stock Return in Indonesia

Period	Independent Variable	z-statistic	Prob.
Before Covid-19	C	-0.6482	0.5169
	V Brent	0.0958	0.9237
	V Gold	0.6468	0.5178
	C	0.6602	0.5091
	Resid	0.7937	0.4274
	GARCH	2.4397	0.0147**
During Covid-19	C	-1.3148	0.1886
	V Brent	0.9479	0.3432
	V Gold	1.2387	0.2155
	C	1.4456	0.1483
	Resid	2.3424	0.0192
	GARCH	6.0158	0.0000***
Combination	C	-0.8037	0.4216
	V Brent	0.3018	0.7628
	V Gold	0.8174	0.4137
	C	2.1980	0.0279
	Resid	3.4361	0.0006
	GARCH	11.5908	0.0000***

***significant at the level of 1% significance
**significant at the level of 5% significance

Table 5
The Effect of WTI and Gold Price Return on Stock Return in Indonesia

Period	Independent Variable	z-statistic	Prob.
Before Covid-19	C	0.8589	0.3904
	R WTI	-1.5697	0.1165
	R Gold	-1.6023	0.1091
	C	0.7496	0.4535
	Resid	1.0303	0.3029
	GARCH	2.3082	0.0210**
During Covid-19	C	0.4096	0.6821
	R WTI	1.3193	0.1871
	R Gold	0.4073	0.6838
	C	1.5005	0.1335
	Resid	2.3765	0.0175
	GARCH	6.3096	0.0000***
Combination	C	1.3192	0.1871
	R WTI	1.0518	0.2929
	R Gold	-1.2752	0.2023
	C	2.1745	0.0297
	Resid	3.4174	0.0006
	GARCH	11.6804	0.0000***

***significant at the level of 1% significance
**significant at the level of 5% significance

Table 6 is the GARCH (1,1) test result of the Brent oil and gold return effects on stock return. The probability value of GARCH in each period is lower than the significance level (5%), which means the data following the GARCH pattern. In each period, the probability value of gold is greater than the significance level (1%, 5%, 10%). The probability value of Brent oil before the pandemic is greater than the significance level, while during the pandemic is lower than the significance level. The result proves gold return has no significant effect on stock return in each period. In the period before the pandemic, Brent oil return has no significant effect on stock return, while during the pandemic Brent oil return has a positive effect on stock return.

Table 6
The Effect of Brent and Gold Price Return on Stock Return in Indonesia

Period	Independent Variable	z-statistic	Prob.
Before Covid-19	C	0.8354	0.4035
	R Brent	-1.5619	0.1183
	R Gold	-1.5303	0.1259
	C	0.7307	0.4650
	Resid	0.9917	0.3214
	GARCH	2.2353	0.0254**
During Covid-19	C	0.1962	0.8445
	R Brent	3.8740	0.0001***
	R Gold	0.5502	0.5822
	C	1.4860	0.1373
	Resid	2.3343	0.0196
	GARCH	6.4716	0.0000***
Combination	C	1.0680	0.2855
	R Brent	2.2586	0.0239**
	R Gold	-1.4309	0.1525
	C	2.2058	0.0274
	Resid	3.3730	0.0007
	GARCH	11.5541	0.0000***

***significant at the level of 1% significance
**significant at the level of 5% significance

Table 7 is the GARCH (1,1) test result to see the effects of the volatility of WTI oil and gold on stock volatility. The probability value of GARCH in each period is greater than the significance level (5%), which means the data does not follow the GARCH pattern. In each period, the probability value of each independent variable is lower than the significance level (1%, 5%, 10%). The result proves in each period WTI oil volatility has a positive effect on stock volatility. In the period before the pandemic, gold volatility has a positive effect on stock volatility, while during the pandemic gold volatility has a negative effect on stock volatility.

Table 7
The Effect of WTI and Gold Price Volatility on Stock Return Volatility in Indonesia

Period	Independent Variable	z-statistic	Prob.
Before Covid-19	C	655.0543	0.0000
	V WTI	10.7687	0.0000***
	V Gold	9.4331	0.0000***
	C	0.2067	0.8363
	Resid	-0.7802	0.4353
	GARCH	0.2702	0.7870
During Covid-19	C	2523.6810	0.0000
	V WTI	22.8817	0.0000***
	V Gold	-248.9943	0.0000***
	C	0.3119	0.7551
	Resid	0.2388	0.8113
	GARCH	0.3456	0.7297
Combination	C	5145.7760	0.0000
	V WTI	29.4577	0.0000***
	V Gold	-105.0827	0.0000***
	C	4.8199	0.0000
	Resid	1.3505	0.1769
	GARCH	-0.3313	0.7404

***significant at the level of 1% significance
**significant at the level of 5% significance

Table 8 is the GARCH (1,1) test result of the volatility of Brent oil and gold effects on stock volatility. The probability value of each period is greater GARCH during the pandemic is greater than the significance level (5%), which indicates that the data does not follow the GARCH pattern. In each period, the probability value of Brent oil is lower than the significance level (1%, 5%, 10%). The probability value of gold before the pandemic is lower than the significance, while during the pandemic is greater than the significance. The result proves in each period Brent oil volatility has a positive effect on stock volatility. In the period before the pandemic, gold volatility has a positive effect on stock volatility, while during the pandemic gold volatility has a negative effect on stock volatility.

Table 8
The Effect of Brent and Gold Price Volatility on Stock Return Volatility in Indonesia

Period	Independent Variable	z-statistic	Prob.
Before Covid-19	C	3548.7960	0.0000
	V Brent	34.0622	0.0000***
	V Gold	132.4923	0.0000***
	C	0.4655	0.6416
	Resid	0.3744	0.7081
	GARCH	0.4550	0.6491
During Covid-19	C	460.011	0.0000
	V Brent	29.7073	0.0000***
	V Gold	-20.1894	0.0000***
	C	2.6622	0.0078
	Resid	1.0136	0.3108
	GARCH	-0.0415	0.9669
Combination	C	4536.493	0.0000
	V Brent	23.5104	0.0000***
	V Gold	-8.6840	0.0000***
	C	3.6466	0.0003
	Resid	1.3030	0.1926
	GARCH	-0.0361	0.9712

***significant at the level of 1% significance

Discussion

Seeing from the results of the GARCH test analysis in Tables 3 and 4, it can be said that the volatility of Brent oil, WTI oil, and gold does not affect stock returns in both periods. It means that Brent oil, WTI oil, and gold are not related to stock returns from January 2019 to October 2020.

Table 3 and Table 4 show the first and second hypotheses results. According to both tables, H_{1a}, H_{1b}, H_{2a}, and H_{2b} are rejected. The volatility of both Brent oil and WTI oil does not significantly affect stock returns before and during the Covid-19 pandemic. It means Brent oil volatility, WTI oil volatility, and stock returns do not correlate whenever an economic crisis happens or not. This result has the same statement in the research conducted by Maghyereh (2004) that oil volatility does not affect stock index returns in emerging markets. In contrast to the results of Raza *et al.* (2016) and Luo and Qin (2016), their studies find that oil volatility negatively affects stock market returns. In general, this study's result is supported by the research conducted by Safitri and Robiyanto (2020) that the correlation between oil prices and the sectoral stock price index in Indonesia tends to be weak. Also, the research of Istamar, Sarfiah, and Rusmijiati (2019) states that oil does not affect JCI. The high oil volatility causes the decreasing return stock market for the long term, which means the volatility of oil reduces indirectly to the company's profit margins. As a result, the investors may be reluctant to invest in the stock market (Gokmenoglu & Fazlollahi, 2015). The impact of the Covid-19 pandemic poses unprecedented risks, such as the fall in global oil prices that cause investors to suffer losses in a short time. Furthermore, the impact of the Covid-19 pandemic on financial markets has yielded uncertain results in both the short and long term (Zhang & Hamori, 2021).

Both Table 3 and Table 4 also show the result of the third hypothesis: H_{3a} and H_{3b} are rejected, which means that gold volatility has no significant effect on stock returns before and during the Covid-19 pandemic. There is no correlation between gold volatility and stock market returns. It is contrary to the research conducted by Raza *et al.* (2016) and Ali *et al.* (2020). They state that gold volatility brings negative impacts on stock market returns. Contuk, Burucu, and Gungor (2013) said that gold is not a local investment instrument, but the de facto gold standard is a global commodity, so the price changes are not due to local factors but macro factors. Besides, gold is not the only factor that influences stocks, but other factors can also influence stocks: inflation, exchange rates, and economic growth. It can be concluded that gold price volatility does not affect stock returns because many factors affect stock returns. Bhuyan and Dash (2018) also said that there is no causality relationship between gold and stock returns. During the Covid-19 pandemic, the increase in global demand for gold leads gold prices and return volatility to increase too. It happens because gold is a safe-haven asset when an economic crisis tends to be uncorrelated or negatively correlated (Yousef & Shehadeh, 2020).

Conclusions and Implications

The study finds that the volatility of oil (Brent and WTI) and gold has no significant effects on stock returns in the period before and during the pandemic Covid-19. Before the Covid-19 pandemic, there were

other pandemics, such as the Ebola outbreak, that impacted the global economy. The decline in returns occurred in financial markets. The events of the Ebola outbreak covered by the media can increase anxiety, and investors are reluctant to invest (Ichev & Marinč, 2018).

The occurrence of volatility in the JCI is due to the investors withdrawing their funds from the stock market when the Covid-19 pandemic occurs in Indonesia. They begin to find safe investments because safe investments can be used as a hedge to reduce the risks (Ibrahim & Baharom, 2011). The results of the study prove that gold can be used as an investment in a financial crisis, like the Covid-19 pandemic, compared to oil since the decrease in global demand for oil during the Covid-19 pandemic can lead to oil price fluctuations. Hongsakulvasu and Liammukda (2020) said that oil demand fell drastically due to the Covid-19 pandemic and the oil price war. Oil demand fell because almost every country implemented a lockdown policy due to the Covid-19 pandemic. Economic activities were forced to stop, especially land and air travel.

The implication of this study supports the concept of gold as a safe haven in a financial crisis, and it is hopefully can help investors in considering gold and oil instruments to enter their portfolios when facing a crisis by looking at each volatility. As a safe haven, gold is uncorrelated with any asset or negatively correlated.

The limitations in the study are focusing on the Indonesian capital market, while the Covid-19 pandemic shakes the global economy. Further analysis for oil-exporters countries is needed to find the results that might be different. Future research will be better if the study compares the impact of the Covid-19 pandemic on developing countries with developed countries. Besides, other independent variables such as changes in bonds, exchange rates, and economic growth need to be referred to in further research to determine the impacts on the Indonesian capital market. Furthermore, it is recommended for future research to extend the observation period considering the Covid-19 pandemic still occurring today to obtain more findings in detail about the volatility of oil and gold prices, including the vaccine distribution as another area of concern.

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