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ABSTRACT

This study scrutinizes the influence of Covid-19 toward returns and volatility spillover in the Indonesian stock market and international gold price. This study employs secondary data from Investing.com. Data used in this study are closing price and returns of the Indonesian stock market and international gold price. Data were analyzed by using BEKK-GARCH techniques. The results obtained from this study show there is strong relationship between volatility spillover and return exists. ICI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period. The return value tends to be inversely proportional to volatility, where when volatility overflows, the return will decrease and vice versa. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between two instruments.

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Volatility Spillover between Indonesian Stock Market and Gold during Covid-19 Pandemic

Christopher Anthony Surya Dharma¹, Robiyanto^{2*}, Harijono³, Triyanto⁴

Abstrak

Penelitian ini mengkaji pengaruh Covid-19 terhadap return dan volatilitas di pasar saham Indonesia dan harga emas internasional. Penelitian ini menggunakan data sekunder dari investing.com. Data yang digunakan dalam penelitian ini adalah harga penutupan pasar saham Indonesia dan harga emas internasional. Semua data dalam penelitian ini diperoleh dari www.investing.com dan Bursa Efek Indonesia. Data dianalisis dengan menggunakan teknik BEKK-GARCH. Hasil yang diperoleh dari penelitian ini menunjukkan terdapat hubungan yang kuat antara *Volatility Spillover* dan *Return*. *Return* IHSG dan *return* emas dipengaruhi oleh volatilitas limpahan baik sebelum Covid-19, selama Covid-19, dan periode secara keseluruhan. Nilai *return* cenderung berbanding terbalik dengan volatilitas, dimana ketika volatilitas melimpah maka *return* akan menurun dan sebaliknya. Memantau dampak volatilitas antara pasar saham dan harga emas dapat membantu dalam manajemen risiko dan kemampuan melihat hubungan antara pasar saham dan harga emas dapat membantu mengidentifikasi tingkat korelasi antara dua instrumen.

Kata kunci: Covid-19, imbal hasil, limpahan volatilitas, pasar saham Indonesia, emas

Abstract

This study scrutinizes the influence of Covid-19 toward returns and volatility spillover on the Indonesian stock market and international gold price. This study employs secondary data from investing.com. Data used in this study are closing price and returns of the Indonesian stock market and international gold price. All data used in this study taken from www.investing.com and Indonesia Stock Exchange (IDX). Data were analyzed by using BEKK-GARCH techniques. The results obtained from this study show there is strong relationship between volatility spillover and return exists. JCI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period. The return value tends to be inversely proportional to volatility, where when volatility overflows, the return will decrease and vice versa. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between two instruments.

Keywords: Covid-19, return, volatility spillover, Indonesia stock market, gold

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INTRODUCTION

The Coronavirus (Covid-19) outbreak began in December 2019 in Wuhan (China), has infected more than one million people and reached 60,000 deaths in 100 days, this outbreak has been called a pandemic since March 11, 2020 (Ali et al., 2020). According to research conducted by Susilawati et al. (2020), until April 25, 2020, Indonesia has reported as many as 50,563 humans have been infected with Covid-19, and there are 8,211 positive corona cases, and there are 689 deaths. Research conducted by Olivia et al. (2020), there are 39,294 Covid-19 cases that have occurred in Indonesia and the death rate that occurred was 2,198 people. Covid-19 cases in the world have reached 8,139,560 cases and the death rate has reached 440,341 as of June 17, 2020.

The Covid-19 pandemic has had a huge social and economic impact on the world. Goodell (2020) stated that the impact on the economy can be indicated through banking, insurance, government, public and others. The Covid-19 pandemic in Indonesia has caused a 0.4% decline in the Indonesian economy (Susilawati et al., 2020). The impact of Covid-19 on the economy is felt by investors who have invested in the capital market, cryptocurrency, gold and so on, because the economic value at that time can be said to be negative.

Investment activities inevitably involve various risks so that they require careful analysis before making decisions in investing. Investments in the Indonesian stock market can be made by individuals or institutions both domestically and abroad. Apart from investing in the Indonesian stock market, investments can also be made by purchasing gold. The world gold price is the price applied to gold trading in the global market. Gold prices are influenced by various factors such as demand and supply, global economic stability, inflation and others. Gold prices can fluctuate significantly in the short and long term.

Price changes in a financial market affect or spillover into other financial markets this can be referred to as spillover volatility. Spillover volatility can be challenging for investors and traders as significant price changes can cause turmoil in other markets. It is important for investors and traders to understand the interconnectedness of financial markets and be aware of the risks involved. In addition to being a challenge, this spillover of volatility can also affect investors' or traders' returns. Yield is the return or growth earned from investing. Yield is an important factor for investors to consider in order to evaluate their investment performance.

Research by Arouri et al. (2015), conducted before Covid-19 by observing international gold prices and stock returns in China. Research conducted by Klein et al. (2018), examines Bitcoin which is used as a comparison between volatility, correlation, and portfolio performance. Research conducted by Bala & Takimoto (2017), discusses the spillover of volatility in the Nigerian stock market during the financial crisis. Research conducted by Maghyreh et al. (2017), discusses volatility spillovers and cross hedging between gold, oil and equities. Spillover volatility on Exchange-Traded Funds (ETFs) in ASEAN. The various studies mentioned previously examined volatility in various conditions and various variables but have not conducted a study of the spillover volatility of gold and the Indonesian stock market.

Research conducted by Vardar & Aydogan (2019), examines Bitcoin with other asset classes in investing in Turkey using the BEKK-GARCH method over a period of nearly eight years, from July 19, 2010 to June 26, 2018 with 2072 observations. Research conducted by Yu et al. (2020), examines oil prices with the stock market in the US and China using the BEKK-GARCH method over a period of 25 years, from 1991 to 2016. Research conducted by

Xie et al. (2021) examined the crude oil market with the Chinese stock market in a period of approximately 11 years, from January 4, 2010 to February 10, 2021 using the BEKK-GARCH method. Various studies mentioned previously, although some of them have been in Covid conditions, have not conducted studies comparing before and during Covid-19. However, none of these studies scrutinize the relationship between JCI and gold prices before Covid-19 and during Covid-19 in terms of volatility and return.

This study was conducted to determine whether there is a relationship between JCI and gold prices before Covid-19 and during Covid-19 in terms of volatility and return. This study uses the BEKK- GARCH method analysis tool because this method is still rarely used in Indonesia, although there have been several studies at the international level. In addition, the BEKK-GARCH method can describe volatility changes in an asset that can affect other volatility changes and is more flexible in handling correlations in volatility while DCC-GARCH is considered less capable of describing complex correlations between assets when compared to BEKK-GARCH. Through this research, it is expected to be useful to provide information about the relationship between JCI and gold prices during the pre-Covid-19 period to the Covid-19 period.

This research is expected to contribute by providing supporting evidence between the JCI value and stock prices in Indonesia. This research is also expected to provide theoretical benefits to academics in adding knowledge and literature on related topics. The practical contribution of monitoring the Indonesian stock market and world gold prices in relation to returns and volatility spillovers is that monitoring the performance of the Indonesian stock market and world gold prices allows investors to diversify their portfolio by investing in different assets. In addition, the returns and volatility of both markets can help investors make informed investment decisions. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between the two.

LITERATURE REVIEW

Volatility. Volatility is a condition of rising and falling prices of investment instruments within a certain period of time. If the level of volatility is high, the price of the instrument can rise in a fast period of time and can also fall in a fast time, causing a large difference between the highest price and the lowest price. However, if the price of the investment instrument is stable, the volatility is low.

Volatility occurs because of new information entering the market that makes market participants reassess by trading assets. Volatility is a measure in determining the risk in investing by showing the rate of price change within a certain period of time (Hussainey et al., 2011). Market volatility has a significant impact on investors because it can affect investment decisions, some investors utilize volatility to find opportunities. Volatility spillover occurs due to unexpected events or events that are unexpected and occur suddenly. Volatility spillover is an event where price fluctuations or volatility of one asset or financial market can affect price fluctuations or volatility of another asset or market.

Return. Return is the difference between the amount expected by investors and the stock market price or the return on capital received by investors due to ownership of a company's shares plus the price in the capital market and divided by the initial price. In a company there are many stakeholders who have different goals so that unbalanced stock

returns will be very important for investors, especially investors who aim to benefit from the investments that have been made. Good financial performance and company management strategies can be reflected in stock returns. Returns are obtained based on fluctuating stock prices through historical data on the company's financial statements. Financial ratios can affect returns which include liquidity ratios, solvency ratios, activity ratios, and profitability ratios (Sorongan, 2016).

Jakarta Composite Index (JCI). The Indonesian Stock Market refers to the buying and selling activities that occur on the Indonesia Stock Exchange (IDX). The stock market plays an important role in the Indonesian economy. The growth and decline of the JCI can reflect economic conditions and investor confidence. JCI is an Indonesian stock market index that reflects the share price movements of a number of companies listed on the IDX. The JCI is used by investors as a measure of the overall performance of the Indonesian stock market. An increase in the JCI can be interpreted as a positive sign regarding economic conditions and investor confidence while a decrease in the JCI can reflect concern or uncertainty in the Indonesian stock market for investors (Jahur et al., 2014).

Before and during the Covid-19 pandemic, the JCI experienced significant changes. Before Covid-19, the JCI generally showed stable growth in accordance with Indonesia's relatively positive economic development. During Covid-19 there was a spillover of high volatility and caused a significant decline in early 2020. Economic uncertainty and concerns about the impact of the pandemic caused investors to sell their shares on a large scale, causing dramatic movements.

Gold. Gold has always been seen as a safe asset, making it a type of investment that has a stable value with high liquidity and little risk. Gold has an attraction to the expected value of price increases or the way investors maintain it, a positive attraction that makes gold more attractive to investors. Gold has several advantages over other instruments that can attract investors. The form, intrinsic value, and carrying of gold are advantages that other investment instruments do not have (Suryani & Robiyanto, 2021). Demand and supply of other goods determine the price of gold. There are three types of gold demand, namely for industrial and production purposes, bank ownership, and as an investment asset for fund management (Ghosh et al., 2004).

Before Covid-19 and during Covid-19 the gold price experienced significant dynamics. Prior to Covid-19 the gold price was relatively stable with some usual fluctuations in response to global economic factors, monetary policy and geopolitical turmoil. Gold prices generally grew gradually over time, due to its status as a safe haven asset and an attractive investment instrument during uncertainty. During Covid-19, investors tend to buy gold and cause an increase in the price of gold because investors tend to seek refuge in safe haven assets when there is economic uncertainty. In addition, during Covid-19 there is a factor of low interest rates on conventional financial instruments resulting in increased attractiveness to gold as an investment alternative (Murach, 2019).

Relationship between Gold Return and JCI Return to Volatility Spillover. Gold return and JCI return have a complex relationship to spillover volatility in financial markets. Under conditions of economic uncertainty, gold is considered stable amidst uncertainty, whereas the stock market tends to experience high volatility. Gold is also often considered a hedge against inflation, but high inflation can negatively impact the stock market. Gold is generally considered a safe haven for the capital market when experiencing turmoil, because

of gold's role as a medium of exchange in international relations and in this case, gold is the safest refuge to take refuge in the turmoil that occurs in the capital market (Robiyanto, 2018).

Low monetary policy and interest rates prevent gold from generating significant returns as loose monetary policy supports gold prices, and low interest rates also affect the volatility of the JCI (Baek et al., 2020). Also, market sentiment such as economic and financial news can play an important role in influencing gold yields and the JCI to spillover volatility (Cahyapuspita & Robiyanto, 2021; Putra & Robiyanto, 2021). During the global financial crisis, gold became a refuge that investors sought, which could increase volatility. In addition, unstable geopolitics can also increase the demand for gold and JCI thus increasing volatility.

H1: Gold return and JCI returns are affected by volatility spillovers.

METHOD

The data used in this study are secondary data taken from the Indonesia Stock Exchange (IDX) and the price of gold in the international market. The sample periods are January 2018 to January 2022 which is divided into two periods, namely before the existence of Covid- 19 and when Indonesia experienced the Covid-19 Pandemic. The period from January 2018 to December 2019, which is the time when Indonesia has not felt the existence of Covid-19, January 2020, which is the time when Indonesia is beginning to feel the impact of Covid-19 to January 2022, which is the time when Indonesia is experiencing a transition to the Covid-19 Endemic. All data used in this study taken from www.investing.com and Indonesia Stock Exchange (IDX).

This study uses various methods of BEKK-GARCH with distribution error – t-student to handle JCI and world gold prices. This study examines the relationship between JCI and world gold prices that have been classified based on symmetric econometric models (BEKK-GARCH model and asymmetric BEKK-GARCH model) and parameter characteristics (full, triangular and diagonal BEKK). Regarding the bivariate GARCH process of the t-student error distribution, it will be defined by the one lagged vector autoregressive (VAR) equation as follows:

$$\begin{pmatrix} r_{S,t} \\ r_{G,t} \end{pmatrix} = \begin{pmatrix} \mu_S \\ \mu_G \end{pmatrix} + \begin{pmatrix} \phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22} \end{pmatrix} \begin{pmatrix} r_{S,t-1} \\ r_{G,t-1} \end{pmatrix} + \begin{pmatrix} \epsilon_{S,t} \\ \epsilon_{G,t} \end{pmatrix}$$

$$\begin{pmatrix} \epsilon_{S,t} \\ \epsilon_{G,t} \end{pmatrix} = \begin{pmatrix} h_t^S & h_t^{SG} \\ h_t^{GS} & h_t^G \end{pmatrix}^{\frac{1}{2}} \begin{pmatrix} \eta_t^S \\ \eta_t^G \end{pmatrix}$$

After forming the average VAR equation, it is continued by creating an equation using H_t in accordance with the full BEKK-GARCH created by Engle (1982) as follows:

$$H_t = C' C + A' \begin{pmatrix} \epsilon_{S,t-1} \\ \epsilon_{G,t-1} \end{pmatrix} (\epsilon_{S,t-1} \quad \epsilon_{G,t-1}) A + B' H_{t-1} B$$

Among them, C is an upper triangular matrix, A and B are coefficient matrices, so we can rewrite the process as follows:

$$\begin{pmatrix} h_t^S & h_t^{SG} \\ h_t^{GS} & h_t^G \end{pmatrix} = \begin{pmatrix} C_S & 0 \\ C_{SG} & C_G \end{pmatrix} \begin{pmatrix} C_S & C_{SG} \\ 0 & C_G \end{pmatrix}$$

$$+ \begin{pmatrix} a_S & a_{SG} \\ a_{SG} & a_G \end{pmatrix} \begin{pmatrix} \epsilon_{S,t-1} \\ \epsilon_{G,t-1} \end{pmatrix} (\epsilon_{S,t-1} \quad \epsilon_{G,t-1}) \begin{pmatrix} a_S & a_{SG} \\ a_{SG} & a_G \end{pmatrix}$$

$$+ \begin{pmatrix} b_S & b_{GS} \\ b_{SG} & b_G \end{pmatrix} \begin{pmatrix} h_{t-1}^S & h_{t-1}^{SG} \\ h_{t-1}^{SG} & h_{t-1}^G \end{pmatrix} \begin{pmatrix} b_S & b_{SG} \\ b_{GS} & b_G \end{pmatrix}$$

$$\begin{aligned} h_t^S &= c_S + a_S^2 \epsilon_{S,t-1}^2 + 2a_S a_{GS} \epsilon_{S,t-1} \epsilon_{G,t-1} + a_{GS}^2 \epsilon_{G,t-1}^2 + b_S^2 h_{t-1}^2 + 2b_S b_{GS} h_{t-1}^{SG} + b_{GS}^2 h_{t-1}^G \\ h_t^{SG} &= c_{SG} + a_S a_{SG} \epsilon_{S,t-1}^2 + (a_{GS} a_{SG} + a_S a_G) \epsilon_{S,t-1} \epsilon_{G,t-1} + a_{GS} a_G \epsilon_{G,t-1}^2 + b_S b_{SG} h_{t-1}^S + \\ &\quad (b_{GS} b_{SG} + b_S b_G) h_{t-1}^{SG} + b_{GS} b_G h_{t-1}^G \\ h_t^G &= c_S + a_{SG}^2 \epsilon_{S,t-1}^2 + 2a_{SG} a_G \epsilon_{S,t-1} \epsilon_{G,t-1} + a_G^2 \epsilon_{G,t-1}^2 + b_{SG}^2 h_{t-1}^2 + 2b_{SG} b_G h_{t-1}^{SG} + b_{GS}^2 h_{t-1}^G \end{aligned}$$

RESULT AND DISCUSSION

Descriptive statistics and stochastic properties are shown in Table 1 for JCI returns and Table 2 for gold returns. The descriptive statistical analysis presented is basic statistics consisting of mean, standard deviation, skewness and kurtosis. The stochastic properties presented consist of Jarque-Bera, Dickey-Fuller and Phillips-Perron.

Table 1. Descriptive Statistics and Stochastic Properties of JCI Return

	Before Covid-19	During Covid-19	Overall
Observations	727	267	994
Mean	-0.000011	0.000408	0.000101
Standard Deviation	0.012089	0.008505	0.011236
Skewness	0.144947	0.216602	0.144173
Kurtosis	12.99975	3.819555	13.06302
Jarque-Bera	3031.563	9.560106	4197.476
Dickey-Fuller	-14.05827	-16.93070	-16.779
Phillips-Perron	-25.69525	-16.96038	-30.43595

Source: www.investing.com, processed.

Table 1 shows the results of descriptive statistics and stochastic properties of JCI returns before Covid-19, during Covid-19 and overall. Before Covid-19 there are 727 observations with an average return of -0.000011 and a standard deviation of 0.012089. During Covid-19 there are 267 observations with an average return of 0.000408 and a standard deviation of 0.008505. Overall, there are 994 observations with an average return of -0.000101 and a standard deviation of 0.011236. The Jarque-Bera value before Covid-19, during Covid-19 and overall shows that the JCI return data is not normally distributed. The Dickey-Fuller and Phillips-Perron values before Covid-19, during Covid-19 and overall indicate that the JCI return data is stationary.

Table 2. Descriptive Statistics and Stochastic Properties of Gold Return

	Before Covid-19	During Covid-19	Overall
Observations	727	267	994
Mean	0.000476	-0.00020	0.000295
Standard Deviation	0.008832	0.008451	0.008732
Skewness	-0.557203	-0.516105	-0.542603
Kurtosis	8.661829	4.202689	7.609809
Jarque-Bera	1008.658	27.94512	928.8935

	Before Covid-19	During Covid-19	Overall
Dickey-Fuller	-25.64417	-14.88953	-29.50422
Phillips-Perron	-25.79671	-14.85145	-29.58661

Source: *www.investing.com*, processed

Table 2 shows the results of descriptive statistics and stochastic properties of gold return before Covid-19, during Covid-19 and overall. Before Covid-19 there were 727 observations with an average return of 0.000476 and a standard deviation of 0.008832. During Covid-19 there are 267 observations with an average return of -0.00020 and a standard deviation of 0.008451. Overall, there are 994 observations with an average return of 0.000295 and a standard deviation of 0.008732. The Jarque-Bera value before Covid-19, during Covid-19 and overall shows that the gold return data is not normally distributed. The Dickey-Fuller and Phillips-Perron values before Covid-19, during Covid-19 and overall indicate that the gold yield data is stationary.

Based on the test results of Table 1 and Table 2, it shows that the data has been processed not normally distributed but is in a stationary condition. The BEKK-GARCH model is the appropriate model to use in this study because the data is not normally distributed and to test whether volatility spillovers affect the JCI returns and gold returns. The test results using the BEKK-GARCH method are shown in Table 3.

Table 3. JCI Return and Gold Return against Volatility Spillover (BEKK-GARCH Model)

	BEKK		BEKK		BEKK	
	Before Covid - 19		During Covid - 19		Overall	
	r_{St}	r_{Gt}	r_{St}	r_{Gt}	r_{St}	r_{Gt}
μ	0.000447	0.000376	0.000338	0.00011	0.000423	0.000341
	(0.1602)	(0.1366)	(0.494)	(0.832)	(0.1092)	(0.1305)
r_{St-1}	0.011276	0.011401	0.092061	-0.033276	0.030862	0.010093
	(0.7623)	(0.6356)	(0.0975)	(0.5671)	(0.3172)	(0.6478)
r_{Gt-1}	0.000386	0.000466	3.46E-05	0.000317	0.000344	0.000461
	(0.1284)	(0.1437)	(0.9477)	(0.5187)	(0.1271)	(0.0814)
C	-0.036079	-0.016192	0.088346	-0.071783	-0.005172	-0.027324
	(0.3267)	(0.6622)	(0.1545)	(0.3006)	(0.8661)	(0.3988)
A	0.348419	0.226466	0.37401	-0.215861	0.345134	0.183757
	(0)	(0)	(0.0016)	(0.0736)	(0)	(0)
	0.229851	0.350076	-0.022868	0.374685	0.185521	0.35009
	(0)	(0)	(0.8756)	(0.0021)	(0)	(0)
B	0.908939	0.959623	-0.796055	0.055055	0.904197	0.972735
	(0)	(0)	(0)	(0.965)	(0)	(0)
	0.958478	0.908121	0.983315	-0.794396	0.972149	0.901842
	(0)	(0)	(0)	(0)	(0)	(0)
V	5.40303	5.42246	15.37391	9.804377	5.777542	5.739596
	(0)	(0)	(0.2101)	(0.0327)	(0)	(0)

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	BEKK		BEKK		BEKK	
	Before Covid - 19		During Covid - 19		Overall	
	r_{St}	r_{Gt}	r_{St}	r_{Gt}	r_{St}	r_{Gt}
<i>Model Selection</i>						
LogL	4827.63	4827.267	1804.852	1802.071	6624.991	6625.003
AIC	-13.2662	-13.2652	-13.48009	-13.45918	-13.31922	-13.31924
SBC	-13.19037	-13.18937	-13.31843	-13.29752	-13.25999	-13.25999
HQ	-13.23694	-13.23594	-13.41514	-13.39424	-13.2967	-13.2967

Source: www.investing.com, processed

Table 3 shows the relationship between JCI returns and gold returns that have been processed using the BEKK-GARCH approach. On average, there is no direct influence between JCI returns and gold returns as indicated by the probability >0 . Regarding the estimation of the conditional variance matrix, before Covid-19, during Covid-19 and overall, it proves that the existence of volatility spillover has a significant effect, this is reflected through matrices A and B. However, during Covid-19, gold is only affected by 10% while before Covid-19 and overall gold data is fully affected by the existence of volatility spillover. This finding is consistent with Hariono & Rokhim (2022).

The best LogL number is shown in the calculation results of the overall BEKK, BEKK during Covid-19 shows the best AIC, SBC and HQ numbers where the LogL number has the largest number of 6625.003; the AIC number has the smallest number of -13.48009; the SBC number has the smallest number of -13.31843 and the HQ number has the smallest number of -13.41514. These numbers indicate that in this study, JCI returns and gold returns are not related, but after the spillover of volatility, JCI returns and gold returns become mutually influential. Based on this finding, hence H1 which stated gold return and JCI returns are affected by volatility spillovers, accepted. The results obtained from this study are JCI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period.

In accordance with research conducted Purbasari (2019) volatility spillover can affect stock market returns because volatility is not only an internal factor that affects asset prices but can also be influenced by other external market factors. Volatility spillovers have a significant impact on returns because when volatility increases, asset prices tend to rise and fall faster over a larger range. Significant changes in returns during the Covid-19 period resulted in spillover volatility, as investors tended to sell their assets because they did not get the returns they expected or tended to experience losses (Hariono & Rokhim, 2022).

CONCLUSION

The results of data analysis and discussion in this study answer the research problems that have been built previously. This study has examined the relationship between JCI returns and gold returns to volatility spillover using the BEKK-GARCH method. The results obtained from this study are JCI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period. This result is evidenced by the presence of a value of 0 in the probability number so it can be concluded that the spillover of volatility

has a significant effect on returns. The return value tends to be inversely proportional to volatility, where when volatility overflows, the return will decrease and vice versa.

The practical contribution of monitoring the Indonesian stock market and international gold prices in relation to returns and volatility spillovers is that monitoring the performance of the Indonesian stock market and international gold prices allows investors to diversify their portfolio by investing in different assets. In addition, the returns and volatility of both markets can help investors make informed investment decisions. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between the two instruments.

This research focuses on the relationship between JCI returns and gold returns to spillover volatility in the period before covid-19 and during covid-19. Therefore, it is expected that future research can use other BEKK-GARCH approaches such as ABEKK-GARCH; TBEKK-GARCH; TABEKK-GARCH; DBEKK-GARCH; DABEKK-GARCH, which may get more varied research results. Future study can also add sample sizes such as the period after covid-19, which may affect the research results.

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1 Volatility Spillover between Indonesian Stock Market and Gold during Covid-19 Pandemic

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Abstrak

Penelitian ini mengkaji pengaruh Covid-19 terhadap return dan volatilitas di pasar saham Indonesia dan harga emas internasional. Penelitian ini menggunakan data sekunder dari investing.com. Data yang digunakan dalam penelitian ini adalah harga penutupan pasar saham Indonesia dan harga emas internasional. Semua data dalam penelitian ini diperoleh dari www.investing.com dan Bursa Efek Indonesia. Data dianalisis dengan menggunakan teknik BEKK-GARCH. Hasil yang diperoleh dari penelitian ini menunjukkan terdapat hubungan yang kuat antara Volatility Spillover dan Return. Return IHSG dan return emas dipengaruhi oleh volatilitas limpahan baik sebelum Covid-19, selama Covid-19, dan periode secara keseluruhan. Nilai return cenderung berbanding terbalik dengan volatilitas, dimana ketika volatilitas melimpah maka return akan menurun dan sebaliknya. Memantau dampak volatilitas antara pasar saham dan harga emas dapat membantu dalam manajemen risiko dan kemampuan melihat hubungan antara pasar saham dan harga emas dapat membantu mengidentifikasi tingkat korelasi antara dua instrumen.

Kata kunci: Covid-19, imbal hasil, limpahan volatilitas, pasar saham Indonesia, emas

1 Abstract

This study scrutinizes the influence of Covid-19 toward returns and volatility spillover on the Indonesian stock market and international gold price. This study employs secondary data from investing.com. Data used in this study are closing price and returns of the Indonesian stock market and international gold price. All data used in this study taken from www.investing.com and Indonesia Stock Exchange (IDX). Data were analyzed by using BEKK-GARCH techniques. The results obtained from this study show there is strong relationship between volatility spillover and return exists. JCI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period. The return value tends to be inversely proportional to volatility, where when volatility overflows, the return will decrease and vice versa. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between two instruments.

Keywords: Covid-19, return, volatility spillover, Indonesia stock market, gold

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INTRODUCTION

The Coronavirus (Covid-19) outbreak began in December 2019 in Wuhan (China), has infected more than one million people and reached 60,000 deaths in 100 days, this outbreak has been called a pandemic since March 11, 2020 (Ali et al., 2020). According to research conducted by Susilawati et al. (2020), until April 25, 2020, Indonesia has reported as many as 50,563 humans have been infected with Covid-19, and there are 8,211 positive corona cases, and there are 689 deaths. Research conducted by Olivia et al. (2020), there are 39,294 Covid-19 cases that have occurred in Indonesia and the death rate that occurred was 2,198 people. Covid-19 cases in the world have reached 8,139,560 cases and the death rate has reached 440,341 as of June 17, 2020.

The Covid-19 pandemic has had a huge social and economic impact on the world. Goodell (2020) stated that the impact on the economy can be indicated through banking, insurance, government, public and others. The Covid-19 pandemic in Indonesia has caused a 0.4% decline in the Indonesian economy (Susilawati et al., 2020). The impact of Covid-19 on the economy is felt by investors who have invested in the capital market, cryptocurrency, gold and so on, because the economic value at that time can be said to be negative.

Investment activities inevitably involve various risks so that they require careful analysis before making decisions in investing. Investments in the Indonesian stock market can be made by individuals or institutions both domestically and abroad. Apart from investing in the Indonesian stock market, investments can also be made by purchasing gold. The world gold price is the price applied to gold trading in the global market. Gold prices are influenced by various factors such as demand and supply, global economic stability, inflation and others. Gold prices can fluctuate significantly in the short and long term.

Price changes in a financial market affect or spillover into other financial markets this can be referred to as spillover volatility. Spillover volatility can be challenging for investors and traders as significant price changes can cause turmoil in other markets. It is important for investors and traders to understand the interconnectedness of financial markets and be aware of the risks involved. In addition to being a challenge, this spillover of volatility can also affect investors' or traders' returns. Yield is the return or growth earned from investing. Yield is an important factor for investors to consider in order to evaluate their investment performance.

Research by Arouri et al. (2015), conducted before Covid-19 by observing international gold prices and stock returns in China. Research conducted by Klein et al. (2018), examines Bitcoin which is used as a comparison between volatility, correlation, and portfolio performance. Research conducted by Bala & Takimoto (2017), discusses the spillover of volatility in the Nigerian stock market during the financial crisis. Research conducted by Maghyereh et al. (2017), discusses volatility spillovers and cross hedging between gold, oil and equities. Spillover volatility on Exchange-Traded Funds (ETFs) in ASEAN. The various studies mentioned previously examined volatility in various conditions and various variables but have not conducted a study of the spillover volatility of gold and the Indonesian stock market.

Research conducted by Vardar & Aydogan (2019), examines Bitcoin with other asset classes in investing in Turkey using the BEKK-GARCH method over a period of nearly eight years, from July 19, 2010 to June 26, 2018 with 2072 observations. Research conducted by Yu et al. (2020), examines oil prices with the stock market in the US and China using the BEKK-GARCH method over a period of 25 years, from 1991 to 2016. Research conducted by

²⁰ Xie et al. (2021) examined the crude oil market with the Chinese stock market in a period of approximately 11 years, from January 4, 2010 to February 10, 2021 using the BEKK-GARCH method. Various studies mentioned previously, although some of them have been in Covid conditions, have not conducted studies comparing before and during Covid-19. However, none of these studies scrutinize the relationship between JCI and gold prices before Covid-19 and during Covid-19 in terms of volatility and return.

This study was conducted to determine whether there is a relationship between JCI and gold prices before Covid-19 and during Covid-19 in terms of volatility and return. This study uses the BEKK- GARCH method analysis tool because this method is still rarely used in Indonesia, although there have been several studies at the international level. In addition, the BEKK-GARCH method can describe volatility changes in an asset that can affect other volatility changes and is more flexible in handling correlations in volatility while DCC-GARCH is considered less capable of describing complex correlations between assets when compared to BEKK-GARCH. Through this research, it is expected to be useful to provide information about the relationship between JCI and gold prices during the pre-Covid-19 period to the Covid-19 period.

This research is expected to contribute by providing supporting evidence between the JCI value and stock prices in Indonesia. This research is also expected to provide theoretical benefits to academics in adding knowledge and literature on related topics. The practical contribution of monitoring the Indonesian stock market and world gold prices in relation to returns and volatility spillovers is that monitoring the performance of the Indonesian stock market and world gold prices allows investors to diversify their portfolio by investing in different assets. In addition, the returns and volatility of both markets can help investors make informed investment decisions. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between the two.

LITERATURE REVIEW

Volatility. Volatility is a condition of rising and falling prices of investment instruments within a certain period of time. If the level of volatility is high, the price of the instrument can rise in a fast period of time and can also fall in a fast time, causing a large difference between the highest price and the lowest price. However, if the price of the investment instrument is stable, the volatility is low.

Volatility occurs because of new information entering the market that makes market participants reassess by trading assets. Volatility is a measure in determining the risk in investing by showing the rate of price change within a certain period of time (Hussainey et al., 2011). Market volatility has a significant impact on investors because it can affect investment decisions, some investors utilize volatility to find opportunities. Volatility spillover occurs due to unexpected events or events that are unexpected and occur suddenly. Volatility spillover is an event where price fluctuations or volatility of one asset or financial market can affect price fluctuations or volatility of another asset or market.

Return. Return is the difference between the amount expected by investors and the stock market price or the return on capital received by investors due to ownership of a company's shares plus the price in the capital market and divided by the initial price. In a company there are many stakeholders who have different goals so that unbalanced stock

returns will be very important for investors, especially investors who aim to benefit from the investments that have been made. Good financial performance and company management strategies can be reflected in stock returns. Returns are obtained based on fluctuating stock prices through historical data on the company's financial statements. Financial ratios can affect returns which include liquidity ratios, solvency ratios, activity ratios, and profitability ratios (Sorongan, 2016).

Jakarta Composite Index (JCI). The Indonesian Stock Market refers to the buying and selling activities that occur on the Indonesia Stock Exchange (IDX). The stock market plays an important role in the Indonesian economy. The growth and decline of the JCI can reflect economic conditions and investor confidence. JCI is an Indonesian stock market index that reflects the share price movements of a number of companies listed on the IDX. The JCI is used by investors as a measure of the overall performance of the Indonesian stock market. An increase in the JCI can be interpreted as a positive sign regarding economic conditions and investor confidence while a decrease in the JCI can reflect concern or uncertainty in the Indonesian stock market for investors (Jahur et al., 2014).

Before and during the Covid-19 pandemic, the JCI experienced significant changes. Before Covid-19, the JCI generally showed stable growth in accordance with Indonesia's relatively positive economic development. During Covid-19 there was a spillover of high volatility and caused a significant decline in early 2020. Economic uncertainty and concerns about the impact of the pandemic caused investors to sell their shares on a large scale, causing dramatic movements.

Gold. Gold has always been seen as a safe asset, making it a type of investment that has a stable value with high liquidity and little risk. Gold has an attraction to the expected value of price increases or the way investors maintain it, a positive attraction that makes gold more attractive to investors. Gold has several advantages over other instruments that can attract investors. The form, intrinsic value, and carrying of gold are advantages that other investment instruments do not have (Suryani & Robiyanto, 2021). Demand and supply of other goods determine the price of gold. There are three types of gold demand, namely for industrial and production purposes, bank ownership, and as an investment asset for fund management (Ghosh et al., 2004).

Before Covid-19 and during Covid-19 the gold price experienced significant dynamics. Prior to Covid-19 the gold price was relatively stable with some usual fluctuations in response to global economic factors, monetary policy and geopolitical turmoil. Gold prices generally grew gradually over time, due to its status as a safe haven asset and an attractive investment instrument during uncertainty. During Covid-19, investors tend to buy gold and cause an increase in the price of gold because investors tend to seek refuge in safe haven assets when there is economic uncertainty. In addition, during Covid-19 there is a factor of low interest rates on conventional financial instruments resulting in increased attractiveness to gold as an investment alternative (Murach, 2019).

Relationship between Gold Return and JCI Return to Volatility Spillover. Gold return and JCI return have a complex relationship to spillover volatility in financial markets. Under conditions of economic uncertainty, gold is considered stable amidst uncertainty, whereas the stock market tends to experience high volatility. Gold is also often considered a hedge against inflation, but high inflation can negatively impact the stock market. Gold is generally considered a safe haven for the capital market when experiencing turmoil, because

of gold's role as a medium of exchange in international relations and in this case, gold is the safest refuge to take refuge in the turmoil that occurs in the capital market (Robiyanto, 2018).

Low monetary policy and interest rates prevent gold from generating significant returns as loose monetary policy supports gold prices, and low interest rates also affect the volatility of the JCI (Baek et al., 2020). Also, market sentiment such as economic and financial news can play an important role in influencing gold yields and the JCI to spillover volatility (Cahyapuspita & Robiyanto, 2021; Putra & Robiyanto, 2021). During the global financial crisis, gold became a refuge that investors sought, which could increase volatility. In addition, unstable geopolitics can also increase the demand for gold and JCI thus increasing volatility.

H1: Gold return and JCI returns are affected by volatility spillovers.

METHOD

The data used in this study are secondary data taken from the Indonesia Stock Exchange (IDX) and the price of gold in the international market. The sample periods are January 2018 to January 2022 which is divided into two periods, namely before the existence of Covid-19 and when Indonesia experienced the Covid-19 Pandemic. The period from January 2018 to December 2019, which is the time when Indonesia has not felt the existence of Covid-19, January 2020, which is the time when Indonesia is beginning to feel the impact of Covid-19 to January 2022, which is the time when Indonesia is experiencing a transition to the Covid-19 Endemic. All data used in this study taken from www.investing.com and Indonesia Stock Exchange (IDX).

This study uses various methods of BEKK-GARCH with distribution error – t-student to handle JCI and world gold prices. This study examines the relationship between JCI and world gold prices that have been classified based on symmetric econometric models (BEKK-GARCH model and asymmetric BEKK-GARCH model) and parameter characteristics (full, triangular and diagonal BEKK). Regarding the bivariate GARCH process of the t-student error distribution, it will be defined by the one lagged vector autoregressive (VAR) equation as follows:

$$\begin{pmatrix} r_{S,t} \\ r_{G,t} \end{pmatrix} = \begin{pmatrix} \mu_S \\ \mu_G \end{pmatrix} + \begin{pmatrix} \phi_{11} & \phi_{12} \\ \phi_{21} & \phi_{22} \end{pmatrix} \begin{pmatrix} r_{S,t-1} \\ r_{G,t-1} \end{pmatrix} + \begin{pmatrix} \epsilon_{S,t} \\ \epsilon_{G,t} \end{pmatrix}$$

$$\begin{pmatrix} \epsilon_{S,t} \\ \epsilon_{G,t} \end{pmatrix} = \begin{pmatrix} h_t^S & h_t^{SG} \\ h_t^{GS} & h_t^G \end{pmatrix}^{\frac{1}{2}} \begin{pmatrix} \eta_t^S \\ \eta_t^G \end{pmatrix}$$

After forming the average VAR equation, it is continued by creating an equation using H_t in accordance with the full BEKK-GARCH created by Engle (1982) as follows:

$$H_t = C'C + A' \begin{pmatrix} \epsilon_{S,t-1} \\ \epsilon_{G,t-1} \end{pmatrix} (\epsilon_{S,t-1} \quad \epsilon_{G,t-1})A + B'H_{t-1}B$$

Among them, C is an upper triangular matrix, A and B are coefficient matrices, so we can rewrite the process as follows:

$$\begin{pmatrix} h_t^S & h_t^{SG} \\ h_t^{GS} & h_t^G \end{pmatrix} = \begin{pmatrix} C_S & 0 \\ C_{SG} & C_G \end{pmatrix} \begin{pmatrix} C_S & C_{SG} \\ 0 & C_G \end{pmatrix} + \begin{pmatrix} a_S & a_{SG} \\ a_{GS} & a_G \end{pmatrix} \begin{pmatrix} \epsilon_{S,t-1} \\ \epsilon_{G,t-1} \end{pmatrix} (\epsilon_{S,t-1} \quad \epsilon_{G,t-1}) \begin{pmatrix} a_S & a_{SG} \\ a_{GS} & a_G \end{pmatrix}$$

$$+ \begin{pmatrix} b_S & b_{GS} \\ b_{SG} & b_G \end{pmatrix} \begin{pmatrix} h_{t-1}^S & h_{t-1}^{SG} \\ h_{t-1}^{SG} & h_{t-1}^G \end{pmatrix} \begin{pmatrix} b_S & b_{SG} \\ b_{GS} & b_G \end{pmatrix}$$

$$\begin{aligned} h_t^S &= c_S + a_S^2 \epsilon_{S,t-1}^2 + 2a_S a_{GS} \epsilon_{S,t-1} \epsilon_{G,t-1} + a_{GS}^2 \epsilon_{G,t-1}^2 + b_S^2 h_{t-1}^2 + 2b_S b_{GS} h_{t-1}^{SG} + b_{GS}^2 h_{t-1}^G \\ h_t^{SG} &= c_{SG} + a_S a_{SG} \epsilon_{S,t-1}^2 + (a_{GS} a_{SG} + a_S a_G) \epsilon_{S,t-1} \epsilon_{G,t-1} + a_{GS} a_G \epsilon_{G,t-1}^2 + b_S b_{SG} h_{t-1}^S + \\ &\quad (b_{GS} b_{SG} + b_S b_G) h_{t-1}^{SG} + b_{GS} b_G h_{t-1}^G \\ h_t^G &= c_G + a_{SG}^2 \epsilon_{S,t-1}^2 + 2a_{SG} a_G \epsilon_{S,t-1} \epsilon_{G,t-1} + a_G^2 \epsilon_{G,t-1}^2 + b_{SG}^2 h_{t-1}^2 + 2b_{SG} b_G h_{t-1}^{SG} + b_G^2 h_{t-1}^G \end{aligned}$$

RESULT AND DISCUSSION

Descriptive statistics and stochastic properties are shown in Table 1 for JCI returns and Table 2 for gold returns. The descriptive statistical analysis presented is basic statistics consisting of mean, standard deviation, skewness and kurtosis. The stochastic properties presented consist of Jarque-Bera, Dickey-Fuller and Phillips-Perron.

Table 1. Descriptive Statistics and Stochastic Properties of JCI Return

	Before Covid-19	During Covid-19	Overall
Observations	727	267	994
Mean	-0.000011	0.000408	0.000101
Standard Deviation	0.012089	0.008505	0.011236
Skewness	0.144947	0.216602	0.144173
Kurtosis	12.99975	3.819555	13.06302
Jarque-Bera	3031.563	9.560106	4197.476
Dickey-Fuller	-14.05827	-16.93070	-16.779
Phillips-Perron	-25.69525	-16.96038	-30.43595

Source: www.investing.com, processed.

Table 1 shows the results of descriptive statistics and stochastic properties of JCI returns before Covid-19, during Covid-19 and overall. Before Covid-19 there are 727 observations with an average return of -0.000011 and a standard deviation of 0.012089. During Covid-19 there are 267 observations with an average return of 0.000408 and a standard deviation of 0.008505. Overall, there are 994 observations with an average return of -0.000101 and a standard deviation of 0.011236. The Jarque-Bera value before Covid-19, during Covid-19 and overall shows that the JCI return data is not normally distributed. The Dickey-Fuller and Phillips-Perron values before Covid-19, during Covid-19 and overall indicate that the JCI return data is stationary.

Table 2. Descriptive Statistics and Stochastic Properties of Gold Return

	Before Covid-19	During Covid-19	Overall
Observations	727	267	994
Mean	0.000476	-0.00020	0.000295
Standard Deviation	0.008832	0.008451	0.008732
Skewness	-0.557203	-0.516105	-0.542603
Kurtosis	8.661829	4.202689	7.609809
Jarque-Bera	1008.658	27.94512	928.8935

	Before Covid-19	During Covid-19	Overall
Dickey-Fuller	-25.64417	-14.88953	-29.50422
Phillips-Perron	-25.79671	-14.85145	-29.58661

Source: www.investing.com, processed

Table 2 shows the results of descriptive statistics and stochastic properties of gold return before Covid-19, during Covid-19 and overall. Before Covid-19 there were 727 observations with an average return of 0.000476 and a standard deviation of 0.008832. During Covid-19 there are 267 observations with an average return of -0.00020 and a standard deviation of 0.008451. Overall, there are 994 observations with an average return of 0.000295 and a standard deviation of 0.008732. The Jarque-Bera value before Covid-19, during Covid-19 and overall shows that the gold return data is not normally distributed. The Dickey-Fuller and Phillips-Perron values before Covid-19, during Covid-19 and overall indicate that the gold yield data is stationary.

Based on the test results of Table 1 and Table 2, it shows that the data has been processed not normally distributed but is in a stationary condition. The BEKK-GARCH model is the appropriate model to use in this study because the data is not normally distributed and to test whether volatility spillovers affect the JCI returns and gold returns. The test results using the BEKK-GARCH method are shown in Table 3.

Table 3. JCI Return and Gold Return against Volatility Spillover (BEKK-GARCH Model)

	BEKK		BEKK		BEKK	
	Before Covid - 19		During Covid - 19		Overall	
	rS _t	rG _t	rS _t	rG _t	rS _t	rG _t
μ	0.000447	0.000376	0.000338	0.00011	0.000423	0.000341
	(0.1602)	(0.1366)	(0.494)	(0.832)	(0.1092)	(0.1305)
rS _{t-1}	0.011276	0.011401	0.092061	-0.033276	0.030862	0.010093
	(0.7623)	(0.6356)	(0.0975)	(0.5671)	(0.3172)	(0.6478)
rG _{t-1}	0.000386	0.000466	3.46E-05	0.000317	0.000344	0.000461
	(0.1284)	(0.1437)	(0.9477)	(0.5187)	(0.1271)	(0.0814)
C	-0.036079	-0.016192	0.088346	-0.071783	-0.005172	-0.027324
	(0.3267)	(0.6622)	(0.1545)	(0.3006)	(0.8661)	(0.3988)
A	0.348419	0.226466	0.37401	-0.215861	0.345134	0.183757
	(0)	(0)	(0.0016)	(0.0736)	(0)	(0)
	0.229851	0.350076	-0.022868	0.374685	0.185521	0.35009
	(0)	(0)	(0.8756)	(0.0021)	(0)	(0)
B	0.908939	0.959623	-0.796055	0.055055	0.904197	0.972735
	(0)	(0)	(0)	(0.965)	(0)	(0)
	0.958478	0.908121	0.983315	-0.794396	0.972149	0.901842
	(0)	(0)	(0)	(0)	(0)	(0)
V	5.40303	5.42246	15.37391	9.804377	5.777542	5.739596
	(0)	(0)	(0.2101)	(0.0327)	(0)	(0)

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	BEKK		BEKK		BEKK	
	Before Covid - 19		During Covid - 19		Overall	
	r _{St}	r _{Gt}	r _{St}	r _{Gt}	r _{St}	r _{Gt}
<i>Model Selection</i>						
LogL	4827.63	4827.267	1804.852	1802.071	6624.991	6625.003
AIC	-13.2662	-13.2652	-13.48009	-13.45918	-13.31922	-13.31924
SBC	-13.19037	-13.18937	-13.31843	-13.29752	-13.25999	-13.25999
HQ	-13.23694	-13.23594	-13.41514	-13.39424	-13.2967	-13.2967

Source: www.investing.com, processed

Table 3 shows the relationship between JCI returns and gold returns that have been processed using the BEKK-GARCH approach. On average, there is no direct influence between JCI returns and gold returns as indicated by the probability >0. Regarding the estimation of the conditional variance matrix, before Covid-19, during Covid-19 and overall, it proves that the existence of volatility spillover has a significant effect, this is reflected through matrices A and B. However, during Covid-19, gold is only affected by 10% while before Covid-19 and overall gold data is fully affected by the existence of volatility spillover. This finding is consistent with Hariono & Rokhim (2022).

The best LogL number is shown in the calculation results of the overall BEKK, BEKK during Covid-19 shows the best AIC, SBC and HQ numbers where the LogL number has the largest number of 6625.003; the AIC number has the smallest number of -13.48009; the SBC number has the smallest number of -13.31843 and the HQ number has the smallest number of -13.41514. These numbers indicate that in this study, JCI returns and gold returns are not related, but after the spillover of volatility, JCI returns and gold returns become mutually influential. Based on this finding, hence H1 which stated gold return and JCI returns are affected by volatility spillovers, accepted. The results obtained from this study are JCI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period.

In accordance with research conducted Purbasari (2019) volatility spillover can affect stock market returns because volatility is not only an internal factor that affects asset prices but can also be influenced by other external market factors. Volatility spillovers have a significant impact on returns because when volatility increases, asset prices tend to rise and fall faster over a larger range. Significant changes in returns during the Covid-19 period resulted in spillover volatility, as investors tended to sell their assets because they did not get the returns they expected or tended to experience losses (Hariono & Rokhim, 2022).

CONCLUSION

The results of data analysis and discussion in this study answer the research problems that have been built previously. This study has examined the relationship between JCI returns and gold returns to volatility spillover using the BEKK-GARCH method. The results obtained from this study are JCI returns and gold returns are affected by the spillover volatility both before Covid-19, during Covid-19 and overall period. This result is evidenced by the presence of a value of 0 in the probability number so it can be concluded that the spillover of volatility

has a significant effect on returns. The return value tends to be inversely proportional to volatility, where when volatility overflows, the return will decrease and vice versa.

The practical contribution of monitoring the Indonesian stock market and international gold prices in relation to returns and volatility spillovers is that monitoring the performance of the Indonesian stock market and international gold prices allows investors to diversify their portfolio by investing in different assets. In addition, the returns and volatility of both markets can help investors make informed investment decisions. Monitoring the volatility spillover between the stock market and gold prices can help in risk management and being able to see the relationship between the stock market and gold prices can help identify the level of correlation between the two instruments.

This research focuses on the relationship between JCI returns and gold returns to spillover volatility in the period before covid-19 and during covid-19. Therefore, it is expected that future research can use other BEKK-GARCH approaches such as ABEKK-GARCH; TBEKK-GARCH; TBEKK-GARCH; DBEKK-GARCH; DABEKK-GARCH, which may get more varied research results. Future study can also add sample sizes such as the period after covid-19, which may affect the research results.

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