VOLATILITY OF GOLD AND OIL PRICES ON THE INDONESIAN STOCK MARKET IN GEOPOLITICAL CRISIS

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ABSTRACT

This study investigates the impact of oil and gold price volatility on stock market returns in Indonesia during periods of geopolitical instability, specifically the Russia-Ukraine conflict and the Israel-Hamas crisis. Utilizing secondary data, the research analyzes the daily closing prices of West Texas Intermediate (WTI) crude oil, Brent Crude Oil, gold, and the Jakarta Composite Index (JCI). The Generalized Autoregressive Conditional Heteroskedasticity (GARCH) (1,1) model is employed as the primary analytical framework. The findings reveal that oil and gold price volatility exerts a positive and unidirectional influence on Indonesian stock returns during the aforementioned geopolitical crises. This suggests that investors tend to seek safe-haven assets, such as gold, in times of economic uncertainty and geopolitical turmoil. The increased volatility in gold prices is indicative of heightened market instability, particularly during financial crises and geopolitical disruptions. These results corroborate the notion of gold serving as a reliable safe-haven asset during periods of economic and geopolitical uncertainty.

Keywords : *Oil prices, gold prices, volatility, geopolitical event, GARCH.*

ABSTRAK

Penelitian ini menyelidiki dampak volatilitas harga minyak dan emas terhadap imbal hasil pasar saham di Indonesia selama periode ketidakstabilan geopolitik, khususnya konflik Rusia-Ukraina dan krisis Israel-Hamas. Dengan memanfaatkan data sekunder, penelitian ini menganalisis harga penutupan harian minyak mentah West Texas Intermediate (WTI), Brent Crude Oil, emas, dan Indeks Harga Saham Gabungan (IHSG). Model Generalized Autoregressive Conditional Heteroskedasticity (GARCH) (1,1) digunakan sebagai kerangka analisis utama. Temuan penelitian ini mengungkapkan bahwa volatilitas harga minyak dan emas memberikan pengaruh positif dan searah terhadap imbal hasil saham Indonesia selama krisis geopolitik tersebut. Hal ini menunjukkan bahwa investor cenderung mencari aset safe haven, seperti emas, di saat ketidakpastian ekonomi dan gejolak geopolitik. Meningkatnya volatilitas harga emas merupakan indikasi meningkatnya ketidakstabilan pasar, terutama selama krisis keuangan dan gangguan geopolitik. Hasil ini menguatkan gagasan bahwa emas berfungsi sebagai aset safe haven yang andal selama periode ketidakpastian ekonomi dan geopolitik.

Kata kunci : *Harga minyak, harga emas, volatilitas, geopolitical events, GARCH.*

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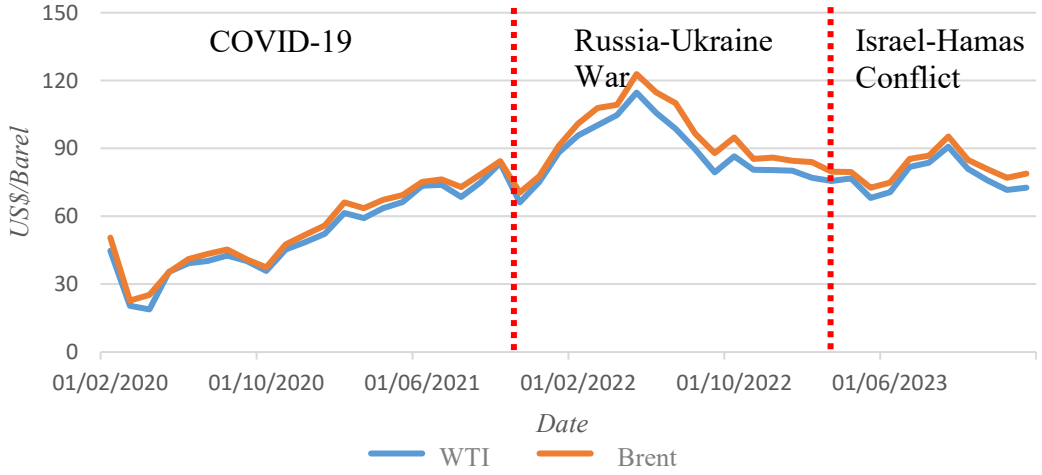
1. INTRODUCTION

Various crises happened in the world from 2020 to 2024 including the COVID-19 pandemic, the Russia-Ukraine war, and the Israel-Hamas war. The crisis created significant uncertainty and has had adverse consequences for global markets. Soaring uncertainty puts fluctuating pressure on global markets and places great pressure on investors (Morema & Bonga-Bonga, 2020). Uncertainty in global markets, especially in investment, increases concerns that bring global markets into a period of complex economic instability. High uncertainty will reduce investment levels for investors, which makes resource allocation and portfolio crisis management a big challenge for investment players in global markets (Xiaozhong et al., 2022). As uncertainty increases, stock market integration and interdependence between assets increases, thereby increasing investment risks and forcing investors to look for other investment opportunities to reduce investment risks.

Commodities are considered an investment alternative that is a safe haven or a hedge for investors to reduce investment risk (Salisu et al., 2020). Oil and gold are examples of commodity markets that are choices for some investors for investment. Oil is a commodity with a high trading value and a very volatile value. The oil value is the primary indicator of exchange rate movements in the global market economy. This means international oil transactions are mainly carried out in US dollars, causing local currency depreciation. With high global oil demand, oil prices can influence global capital market movements (Wen et al., 2019). Very fluctuating values can be caused by shocks and crises that hit the world, for example the Russia-Ukraine war. As seen in Figure 1., during the Russian-Ukrainian war period, West Texas Intermediate (WTI) and Brent crude oil saw a spike in oil prices from US$66.18 per barrel on 01/11/2021 to US$122.84 per barrel on 01/05/2022. Since the outbreak of the war and soaring world oil prices, Western countries have attempted to weaken the value of Russian oil with various economic sanctions. The impact of these sanctions, in December 2022, oil prices were recorded to weaken further. Currently, the average oil price has reached US$84.13 per barrel. This occurrence shows that various factors greatly influence oil prices, especially crises and politics (Marwanti & Robiyanto, 2021).



Source: https://www.investing.com/

Figure 1. Prices of West Texas Intermediate (WTI) and Brent Crude Oil (BCO)

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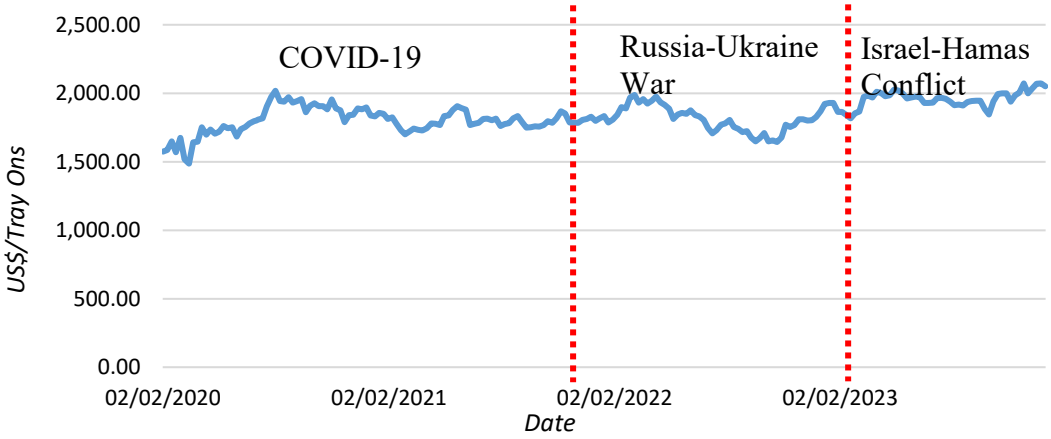
As oil price volatility negatively impacts the global industry, gold is considered a more stable hedge. Gold is known as an asset with a high level of liquidity, is not affected by global inflation, has long-term investment value, and has an objective price (Sui et al., 2021). Because of that, it makes gold as a safe haven that investors are interested in keeping portfolio assets Stable (Chen & Wang, 2019). The significance of gold as a hedging instrument is increasingly evident in situations of uncertainty. The increase in hedging or safe havens using gold against an equity value has an impact on the price of gold (Singh & Joshi, 2019).



Source: https://www.investing.com/

Figure 2. Gold Price

Even though gold has a primary role as a safe haven or hedge, gold price volatility can be considered a reflection of the state of financial markets (Balcilar et al., 2021). An increase in gold price volatility often reflects a risky situation, such as an economic crisis or geopolitical turmoil. Meanwhile, the decline in gold price volatility reflects the stable global economic situation. The dynamics of gold volatility depend on factors such as the demand and supply of gold in the global market. In several crises, it can be observed that gold prices tend to be stable or even experience an increase in market prices when the stock market Composite Stock Price Index (JCI) tends to weaken. This phenomenon can be interpreted as the tendency of investors to seek protection in other assets when there is a decline in asset value during uncertainty or crisis. Thus, understanding gold price volatility reflects global financial conditions and provides an overview of investors' confidence in gold as a safe haven or hedge during situations of crisis or uncertainty.

Table 1 *:* Changes in Situation Uncertainty in Several Global Crises

Crisis	Period (early-peak)	Duration (Month)	Change (%)	
			JCI	Gold Rp
SARS	22 December 2002 – 11 March 2003	3	-10.87%	1.56%
Subprime Mortgage	2 January 2008 – 28 October 2008	10	-59.31%	-0.67%
COVID-19	January 2020 – July 2021	19	-31.08%	9.72%

Source: https://www.investing.com/, processed.

Several previous studies have investigated the volatility of oil prices and gold prices on stock market returns, i.e. (Marwanti & Robiyanto, 2021; Mensi et al., 2021; Morema & Bonga-Bonga, 2020; Qian et al., 2019). However, these studies only examine price volatility before and during the pandemic. Whereas, geopolitical events such as the

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Russia-Ukraine and Israel-Hamas wars could produce different volatility on oil prices and gold prices which will influence stock markets. Higher volatility tends to produce higher risk in stock market which will affect stock market return. Hence, the research question is regarding what's the effect of volatility on oil prices and gold prices toward stock market return.

The focus of this research is using data during the Russia-Ukraine war (24 February 2022 – present) and Israel-Hamas (07 October 2023 – present). Therefore, by using the Autoregressive Conditional Heteroscedasticity GARCH (1,1) model, this research attempts to offer empirical evidence based on the volatility of oil and gold prices on the JCI. The GARCH (1,1) model is used in this research because this model can test volatility that varies and is dynamic in time and financial markets.

It is hoped that the results of this research can provide a significant contribution to investment actors in the investment decision making process, specifically facing economic uncertainty. This research is also directed at providing practical insights to stakeholders in the financial markets and aims to provide valuable references in developing the best investment theories and strategies.

2. LITERATURE REVIEW

Qian et al. (2019) shows that gold and oil prices are influenced by various factors such as the dollar index, federal funds rate, exchange rate and S&P500. This research uses an analysis of variance (ANOVA) model and residual analysis, which is able to show a model to explain large variations in gold and oil prices. This research is also supported by Balcilar et al. (2021) which reveals that SS&P500, gold prices, and oil prices have strong relevance between assets in the context of global financial market dynamics and investment portfolio management. This relevance is supported by the spillover index and VAR-GARCH methods, to test the stability of the model in monitoring the existence of nonlinear effects between assets.

Mensi et al. (2021), also shows that there is a significant influence of oil and gold prices on US and Chinese stock indices. This research uses the Markov-Switching Vector Autoregressive (MS-VAR) method, to analyze the relationship between commodities and price indices during different periods of volatility. Morema & Bonga-Bonga (2020) research also shows that there is a high correlation between stock volatility, especially on the Johannesburg Stock Exchange (JSE) market and sector stocks. However, the correlation between the JSE stock market and commodities is relatively low or insignificant. The research uses the VAR-DCC-GARCH model to analyze the correlation between the volatility of South African oil, gold and stock market prices. Apart from that, the research results of Marwanti & Robiyanto (2021a) show that there is an influence of oil and gold price volatility on stock returns in Indonesia. This research uses the GARCH (1,1) test model to analyze the volatility of Brent oil, WTI, gold and JCI. To the best authors' knowledge, study regarding current geopolitical crises such as the Russia-Ukraine and Israel-Hamas wars still limited. While, these geopolitical crises period could produce different results regarding the variables studied. Therefore, this research will examine the volatility of oil and gold prices in the Jakarta Composite Index (JCI) during the geopolitical period, namely the Russia-Ukraine and Israel-Hamas wars

3. METHOD

This research uses analysis and secondary data in the form of daily closing prices for West Texas Intermediate (WTI) oil and Brent Crude Oil, gold, and the Jakarta

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Composite Index (JCI) for the period February 2022 to January 2024. These two oil prices were being used because these prices are the leading indicators for the world oil prices, while gold is the important investment instrument.

In an effort to achieve the objectives of this research, data was collected in two different periods, namely during the Russia-Ukraine war and during the Israel-Hamas war. The date periods used in this study include February 24, 2022, to October 6, 2023, in the Russian-Ukrainian war period, and October 7, 2023, to January 31, 2024, in the Israel-Hamas war period. This period was chosen to allow an accurate comparison of the impact of the Russia-Ukraine and Israel-Hamas wars on the volatility of gold and oil prices on the Indonesian stock market. In this research, the focus of the dependent variable is stock returns, while oil price volatility and gold price volatility function as independent variables.

Calculation of stock market returns as reflected in the Jakarta Composite Index (JCI) can be calculated using the equation:

$$RJCI_t = \frac{JCI_t - JCI_{t-1}}{JCI_{t-1}}$$

Where:

$RJCI_t$ = JCI stock return at t

JCI_t = JCI on t

JCI_{t-1} = JCI on t-1

Calculation of West Texas Intermediate (WTI) returns can be calculated using the equation:

$$RWTI_t = \frac{WTI_t - WTI_{t-1}}{WTI_{t-1}}$$

Where:

WTI_t = WTI price of *West Texas Intermediate* (WTI) oil on day t

WTI_{t-1}= *West Texas Intermediate* (WTI) oil price on day t-1

Calculation of Brent North Sea oil returns can be calculated using the equation:

$$RBrent_t = \frac{Brent_t - Brent_{t-1}}{Brent_{t-1}}$$

Where:

$RBrent_t$ = *Brent North Sea* oil price on day t

$RBrent_{t-1}$ = *Brent North Sea* oil price on day t-1

Calculation of gold returns can be calculated using the equation:

$$RGold_t = \frac{Gold_t - Gold_{t-1}}{Gold_{t-1}}$$

Where:

$RGold_t$ = Gold price on day t

$RGold_{t-1}$ = Gold price on day t-1

Calculation of the volatility of each commodity which can be calculated using the equation:

$$h_t = \alpha_0 + \sum_{i=1}^{a} \alpha_i \in_{t-1}^2 + \sum_{j=1}^{p} \beta_i \sigma_{t-j}^2$$

Where:

h_t = volatility

$\alpha_i \in_{t-1}^2$ = volatility of the ARCH component

$\beta_i \sigma_{t-j}^2$ = volatility of the GARCH component

This research utilizes the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) method. The GARCH (1,1) model is very suitable for research related to changes in volatility. This is one of the reasons why we use the

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GARCH (1,1) model. Before carrying out the GARCH (1,1) test, a stationarity test was carried out using the Augmented Dickey-Fuller Test. The Stationarity Test is carried out to ensure the stationarity of the data during testing.

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

$R_t = \alpha + \beta_1 VWTI + \beta_2 VGold + \varepsilon_t$

Where:

$\varepsilon_t = \Phi t\, \varepsilon_{t-1} + \ldots + \Phi t\, \varepsilon_{t-p} + \eta_t$

$\eta_t = \sigma_t \varepsilon_t$

$\sigma_t^2 = \alpha_0 + \alpha_1 \eta_{t-1}^2 + .. + \alpha_p \eta_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + .. + \beta_q \sigma_{t-q}^2$

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

$R_t = \alpha + \beta_1 VBrent + \beta_2 VGold + \varepsilon t$

Where:

$\varepsilon_t = \Phi t\, \varepsilon_{t-1} + \ldots + \Phi t\, \varepsilon_{t-p} + \eta_t$

$\eta_t = \sigma_t \varepsilon_t$

$\sigma_t^2 = \alpha_0 + \alpha_1 \eta_{t-1}^2 + .. + \alpha_p \eta_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + .. + \beta_q \sigma_{t-q}^2$

4. RESULT AND DISCUSSION

The stationary test was carried out using the Augmented Dickey-Fuller Test which was supported by a significance level of 1% (0.01). This is important to ensure the stationarity of the data before using the GARCH test in research. The relevance of stationarity can be reflected in the probability value of a data. If the probability value is higher than the significance value, then the data is considered non-stationary. However, if the probability value is lower than the significance value, then the data is considered stationary and the GARCH test can be carried out. Table 2. shows the results of the stationary test using the Augmented Dickey-Fuller Test. The results of the stationarity test show that the variables in each period show stationary values for their probabilities. The probability value for each variable in the Russia-Ukraine, Israel-Hamas, and overall periods is 0.0000, therefore, reflecting that the data is acceptable and can be tested for Normality.

Table 2 : Stationary Test Data Results

Period	Variables	*t-statistic*	Prob,
Russia-Ukraine War	R JKSE	-13,25489	0,0000*
	R WTI	-14,11844	0,0000*
	R Brent	-14,20809	0,0000*
	R Gold	-17,43717	0,0000*
Israel-Hamas Conflict	R JKSE	-8,364735	0,0000*
	R WTI	-7,806313	0,0000*
	R Brent	-7,254696	0,0000*
	R Gold	-7,941636	0,0000*
All Period	R JKSE	-15,01825	0,0000*
	R WTI	-16,01748	0,0000*
	R Brent	-15,98852	0,0000*
	R Gold	-19,04136	0,0000*

*significant at 1% level of significance

Source: Secondary data, analyzed.

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Table 3 : Normality Test Results

Variables	Period	Jarque-Bera	Prob,
R JKSE, V WTI, and V Gold	Russia-Ukraine war	359,4836	0,0000*
	Israel-Hamas Conflict	2,2275	0,3283**
	All Period	319,5002	0,0000*
R JKSE, V Brent, and V Gold	Russia-Ukraine War	367,1128	0,0000*
	Israel-Hamas Conflict	1,5982	0,4497**
	All Period	330,8284	0,0000*
R JKSE, R WTI, and R Gold	Russia-Ukraine War	264,1225	0,0000*
	Israel-Hamas Conflict	0,3820	0,8261**
	All Period	239,2746	0,0000*
R JKSE, R Brent, and R Gold	Russia-Ukraine War	267,1459	0,0000*
	Israel-Hamas Conflict	0,2583	0,8788**
	All Period	242,5443	0,0000*
V JKSE, V WTI, and V Gold	Russia-Ukraine War	0,7125	0,7002**
	Israel-Hamas Conflict	1,1090	0,5743**
	All Period	1,4595	0,4820**
V JKSE, V Brent, and V Gold	Russia-Ukraine War	0,5152	0,7728**
	Israel-Hamas Conflict	1,3116	0,5190**
	All Period	1,7204	0,4230**

***Normally distributed* (Gaussian)
*Not normally distributed (GED)
Source: Secondary data, analyzed.

The Normality Test applies the Jarque-Bera value to see whether the data is normally distributed or not, so that the data can be determined using the appropriate GARCH distribution. There are two types of GARCH distribution, namely Gaussian (normal distribution) and Generalized Error Distribution (GED) (Not normally distribution). If the data is normally distributed, the GARCH test must use Gaussian. If the data is not normally distributed then the GARCH Test must use Generalized Error Distribution (GED). Table 3. shows the results of normality testing on data for each variable in the Russia-Ukraine, Israel-Hamas and overall periods.

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Table 4 : The Effect of WTI Volatility and Gold Volatility on Jakarta Composite Index (JCI) Returns

Period	Independent Variable	Coefficient	z-statistic	Prob,
Russia-Ukraine War	Mean Equation			
	C	-0,000187	-0,197836	0,8432
	V GOLD	-3,45E-16	-0,031989	0,9745
	V WTI	0,634314	1,407569	0,1593
	Variance Equation			
	C	9,69E-06	1,616723	0,1059
	RESID	0,158243	1,692739	0,0905*
	GARCH	0,657977	3,759551	0,0002***
	GED Parameter	1,423443	16,48784	0,0000***
Israel-Hamas Conflict	Mean Equation			
	C	-0,001443	-0,564647	0,5723
	V GOLD	2,66E-14	1,088953	0,2762
	V WTI	2,519835	0,552762	0,5804
	Variance Equation			
	C	6,97E-06	0,980651	0,3268
	RESID	0,152797	0,947557	0,3434
	GARCH	0,706968	2,945653	0,0032***
All period	Mean Equation			
	C	-0,001780	-1,834943	0,0665
	V GOLD	2,21E-14	2,023234	0,0430**
	V WTI	0,962415	2,143630	0,0321**
	Variance Equation			
	C	1,01E-05	1,794709	0,0727
	RESID	0,157694	1,920840	0,0548*
	GARCH	0,645865	3,950874	0,0001***
	GED Parameter	1,454558	17,51216	0,0000***

***Significant at 1% level of significance
** Significant at 5% level of significance
*Significant at 10% level of significance
Source: Secondary data, analyzed.

Table 4. shows the results of the GARCH (1,1) test, namely the influence of WTI oil volatility and gold volatility on the Jakarta Composite Index (JCI) return. The GARCH probability value in each period is lower than the 1% significance level, which means the variable follows the GARCH pattern. In the Russia-Ukraine war period, the relationship between gold volatility and Indonesian stock returns cannot be proven because the probability value is above the significance value. However, interestingly, the sign of the influence of gold volatility toward stock market return is negative, this indicates the potential gold as safe haven for the stock market. This finding relative similar to Marwanti & Robiyanto (2021) and Mensi et al. (2021) in period of Covid-19 pandemic. In Israel-Hamas conflict, the volatility of gold and WTI was not proven to be significantly related to Indonesian stock market returns, because the probability values were greater than the significance level (1%, 5% and 10%). However, the volatility of WTI and gold is proven to have a unidirectional relationship with Indonesian stock returns, because the probability meets the significance value of 5%.

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Tabel 5 : The Effect of Brent Volatility and Gold Volatility on Jakarta Composite Index (JCI) Returns

Period	Independent Variable	Coefficient	z-statistic	Prob,
Russia-Ukraine War	Mean Equation			
	C	-0,000538	-0,549526	0,5826
	V GOLD	1,82E-15	0,172242	0,8632
	V Brent	1,047375	1,656984	0,0975*
	Variance Equation			
	C	8,52E-06	1,567316	0,1170
	RESID	0,148015	1,708175	0,0876*
	GARCH	0,685950	4,199941	0,0000***
	GED Parameter	1,422771	16,84649	0,0000***
Israel-Hamas Conflict	Mean Equation			
	C	-0,000347	-0,257734	0,7966
	V GOLD	2,73E-14	1,105837	0,2688
	V Brent	1,47E-14	0,049671	0,9604
	Variance Equation			
	C	8,69E-06	1,011818	0,3116
	RESID	0,160076	1,000997	0,3168
	GARCH	0,661931	2,715585	0,0066***
All Period	Mean Equation			
	C	-0,002024	-2,025563	0,0428
	V GOLD	2,28E-14	2,127148	0,0334**
	V Brent	1,418750	2,247902	0,0246**
	Variance Equation			
	C	9,18E-06	1,724220	0,0847
	RESID	0,149270	1,924257	0,0543*
	GARCH	0,670295	4,281972	0,0000***
	GED Parameter	1,455288	17,81189	0,0000***

***Significant at 1% level of significance
** Significant at 5% level of significance
*Significant at 10% level of significance
Source: Secondary data, analyzed.

Table 5. shows the results of the GARCH (1,1) test for the effect of gold volatility and Brent oil volatility on Jakarta Composite Index (JCI) return. In each period the variable shows a probability value that is lower than the significance value of 1%. This shows that this variable follows a GARCH pattern in each period. In the Russia-Ukraine period, Brent volatility was proven to have a unidirectional relationship with Indonesian stock market returns. This can be seen because the probability value is lower than the significance value of 10% and the coefficient value is positive. In the entire period, it is also described that the volatility of gold and Brent is proven to have a significant relationship in the same direction to Indonesian stock market returns. This is reflected in the lower probability value with a significance value of 5% and a positive coefficient value. However, in the Israel-Hamas period there was no proven unidirectional relationship with Indonesian stock returns, because the probability value was higher than the significance value. These can be happened because to many nuances and important events happened during this period such as global economic uncertainties led by another important event such as presidential election in several countries.

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Table 6 : The Effect of WTI Returns and Gold Returns Jakarta Composite Index (JCI) Returns

Period	Independent Variable	Coefficient	z-statistic	Prob,
Russia-Ukraine War	Mean Equation			
	C	9,53E-05	0,301782	0,7628
	R GOLD	0,121845	4,107243	0,0000***
	R WTI	0,020371	1,898059	0,0577*
	Variance Equation			
	C	-1,81E-07	-1,234236	0,2171
	RESID	-0,008967	-3,597782	0,0003***
	GARCH	1,009170	8465,579	0,0000***
	GED Parameter	1,642369	9,553297	0,0000***
Israel-Hamas Conflict	Mean Equation			
	C	0,000398	0,509338	0,6105
	RGOLD	0,135624	1,518769	0,1288
	R WTI	-0,017461	-0,445691	0,6558
	Variance Equation			
	C	0,000398	0,965093	0,3345
	RESID	0,135624	1,079987	0,2801
	GARCH	-0,017461	3,848816	0,0001***
All Period	Mean Equation			
	C	0,000210	0,719559	0,4718
	R GOLD	0,110565	3,498242	0,0005***
	R WTI	0,011080	1,016237	0,3095
	Variance Equation			
	C	2,31E-06	1,393038	0,1636
	RESID	0,068056	2,151666	0,0314**
	GARCH	0,883087	15,80076	0,0000***
	GED Parameter	1,449799	16,95528	0,0000***

***Significant at 1% level of significance
** Significant at 5% level of significance
*Significant at 10% level of significance
Source: Secondary data, analyzed.

The GARCH test results in Table 6. show the impact of WTI returns and gold returns on the Jakarta Composite Index (JCI) returns. Each period shows the results of a consistent GARCH pattern, because it has a probability value that is lower than a significance value of 1%. In the Russia-Ukraine war period, gold and WTI returns proved that there was a unidirectional relationship with Indonesian stock market returns. This is characterized by a probability value that is lower than the significance value of 1% and 10% respectively, supported by a positive coefficient value. However, in the Israel-Hamas conflict period it is not proven that WTI volatility has an inverse relationship because the coefficient value is negative. Analysis for the entire period confirms that gold returns prove a strong and directional level of significance to Indonesian stock market returns. As reflected, the probability value is lower than the 1% significance level and the coefficient is positive.

The results of the impact of Brent returns and gold returns on Jakarta Composite Index (JCI) returns are shown in Table 7. In each period, the probability results for the variable GARCH values follow the GARCH pattern. This is characterized by a probability value that is lower than a significance value of 1%. During the Russia-Ukraine War period, it was seen that gold returns and Brent returns were proven to have a

substantial impact in the same direction on Indonesian stock market returns. It can be seen from the probability, which is below the significance value of 1% to 5% and the coefficient value is positive. In the Israel-Hamas conflict period, it is not proven that the variables are related in the same direction because the probability value is higher than the significance value. However, in the overall period it is proven to confirm that gold returns have a unidirectional relationship with Indonesian stock market returns, with a probability value lower than a significance value of 1% and a positive coefficient value.

Table 7 : The Effect of Brent Returns and Gold Returns on Jakarta Composite Index (JCI) Returns

Period	Independent Variable	Coefficient	z-statistic	Prob,
Russia-Ukraine War	Mean Equation			
	C	9,51E-05	0,302949	0,7619
	R GOLD	0,113163	3,730400	0,0002***
	R Brent	0,022685	2,008241	0,0446**
	Variance Equation			
	C	-1,62E-07	-1,144274	0,2525
	RESID	-0,009210	-3,869171	0,0001***
	GARCH	1,009197	8268,162	0,0000***
	GED Parameter	1,648114	9,809679	0,0000***
Israel-Hamas Conflict	Mean Equation			
	C	0,000403	0,512245	0,6085
	RGOLD	0,118079	1,282471	0,1997
	R Brent	0,004242	0,097165	0,9226
	Variance Equation			
	C	6,34E-06	0,915130	0,3601
	RESID	0,125353	0,939266	0,3476
	GARCH	0,743445	3,623351	0,0003***
All Period	Mean Equation			
	C	0,000197	0,675122	0,4996
	R GOLD	0,110673	3,478487	0,0005**
	R Brent	0,016584	1,436938	0,1507
	Variance Equation			
	C	2,32E-06	1,391680	0,1640
	RESID	0,067053	2,145851	0,0319**
	GARCH	0,883513	15,77563	0,0000***
	GED Parameter	1,451695	16,79264	0,0000***

***Significant at 1% level of significance
** Significant at 5% level of significance
*Significant at 10% level of significance
Source: Secondary data, analyzed.

Table 8. shows the GARCH (1,1) results from WTI volatility and gold volatility against the Jakarta Composite Index (JCI) volatility. In the Russia-Ukraine war period and overall, it is proven to show a relationship to the GARCH pattern. This is characterized by a probability value lower than the significance value of 1%. The coefficient values in both periods shows positive values. This means that the variables in both periods are proven to have a unidirectional relationship with Indonesian stock returns. However, the GARCH probability value during the Israel-Hamas conflict period shows that the data does not follow the GARCH pattern, because the probability value is higher than the significance value (1%, 5% and 10%). However, volatility between variables is related to each other in the same direction.

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Table 8 : The Effect of WTI Volatility and Gold Volatility on the Jakarta Composite Index (JCI) Volatility

Period	Independent Variable	Coefficient	z-statistic	Prob,
Russia-Ukraine War	Mean Equation			
	C	2,81E+10	13,51243	0,0000
	V GOLD	0,050805	2,050315	0,0403**
	V WTI	5,02E+12	6,268772	0,0000***
	Variance Equation			
	C	7,09E+19	3,021911	0,0025
	RESID	0,336126	2,798820	0,0051
	GARCH	0,469627	3,164105	0,0016***
Israel-Hamas Conflict	Mean Equation			
	C	4,70E+10	9,820167	0,0000
	V GOLD	0,114095	1,476724	0,1397
	V WTI	-2,38E+13	-2,854447	0,0043**
	Variance Equation			
	C	7,59E+19	1,320172	0,1868
	RESID	0,323916	1,352363	0,1763
	GARCH	0,456554	1,343029	0,1793
All Period	Mean Equation			
	C	2,98E+10	10,85534	0,0000
	V GOLD	0,028654	0,970702	0,3317
	V WTI	5,55E+12	5,808753	0,0000***
	Variance Equation			
	C	8,69E+19	2,797828	0,0051
	RESID	0,290609	2,994769	0,0027**
	GARCH	0,502516	3,592915	0,0003***

***Significant at 1% level of significance
** Significant at 5% level of significance
*Significant at 10% level of significance
Source: Secondary data, analyzed.

The GARCH results in Table 8 also show the volatility of Brent and the volatility of gold against the volatility of the Jakarta Composite Index (JCI). In the Russia-Ukraine war period and overall, the data results show data that follows a GARCH pattern. It can be seen from the probability value that it is less than a significance value of 1%. In contrast to the Israel-Hamas conflict period, the probability value of the data is more than the significance value. This shows that in the Israel-Hamas conflict period it did not follow the GARCH pattern. In the Russia-Ukraine war period, it can be seen that the volatility of gold and Brent has a unidirectional effect because the probability value is lower than the significance value of 10% and 1% respectively, and is supported by a positive coefficient value. In the overall period it also shows that Brent volatility is proven to have a unidirectional effect on Indonesian stock returns, because the probability value is lower than the significance value of 1% and the coefficient value is positive.

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Table 9 : The Effect of Brent Volatility and Gold Volatility on the Jakarta Composite Index (JCI) Volatility

Period	Independent Variable	Coefficient	z-statistic	Prob,
Russia-Ukraine War	Mean Equation			
	C	2,79E+10	12,24056	0,0000
	V GOLD	0,046739	1,844121	0,0652*
	V Brent	6,51E+12	5,220519	0,0000***
	Variance Equation			
	C	7,44E+19	3,051288	0,0023
	RESID	0,344884	2,788021	0,0053**
	GARCH	0,450451	2,931244	0,0034***
Israel-Hamas Conflict	Mean Equation			
	C	3,70E+10	15,61324	0,0000
	V GOLD	0,103478	1,410016	0,1585
	V Brent	0,153974	1,162737	0,2449
	Variance Equation			
	C	1,19E+20	1,561370	0,1184
	RESID	0,382704	1,266638	0,2053
	GARCH	0,249327	0,624136	0,5325
All Period	Mean Equation			
	C	3,11E+10	10,37683	0,0000
	V GOLD	0,017622	0,582006	0,5606
	V Brent	5,33E+12	3,441509	0,0006***
	Variance Equation			
	C	8,62E+19	2,803476	0,0051
	RESID	0,288436	2,977103	0,0029***
	GARCH	0,507142	3,640427	0,0003***

***Significant at 1% level of significance
** Significant at 5% level of significance
*Significant at 10% level of significance
Source: Secondary data, analyzed.

Based on Table 9. in the Russia-Ukraine war period, it shows that there is a positive correlation with the volatility of Brent oil, WTI and gold which is proven to influence returns and volatility of the Jakarta Composite Index (JCI). However, during the period of Israeli-Hamas conflict tensions the return or volatility of Brent oil, WTI oil and gold was not proven to have an influence on the return or volatility of Jakarta Composite Index (JCI) shares. Even though the results from the two short periods are different. Overall, the period shows that the volatility of Brent oil, WTI oil and gold has been proven to be able to significantly influence returns and volatility of the Jakarta Composite Index (JCI).

The volatility of Brent and WTI oil has a positive effect on Indonesian stock returns. This means that the volatility of Brent and WTI oil is correlated in the same direction to Indonesian stock returns during an economic crisis and vice versa. These results are in line with research conducted by Bourghelle et al. (2021), that the volatility of West Texas Intermediate (WTI) oil prices can influence the capital market, thereby triggering capital market fluctuations. Igbinovia & Igbinovia (2019) research also revealed that oil price volatility has a positive influence on Nigerian stock market returns. However, there are differences in research conducted by Marwanti & Robiyanto (2021), which states that Brent oil and WTI oil do not affect stock returns. This indicates that when the volatility of Brent and WTI oil prices increases, Indonesian stock returns also increase and vice

versa. In simple terms, the volatility of Brent and WTI oil has a correlation with Indonesian stock returns during the crisis or not.

The results above show that gold has a positive effect on Indonesian stock returns. This means that the volatility of Brent oil and WTI has a correlation in the same direction as Indonesian stock returns. This statement is supported by research by Ali et al. (2020), which shows that the correlation between changes in gold prices can have an impact on the stock market in Pakistan. This is also supported by the statement of Bonato et al., (2021), states that gold price volatility has a negative effect on the stock market. This shows that gold volatility is correlated with Indonesian stock returns. When the price of gold increases, stock returns also increase and vice versa.

5. CONCLUSION

This research investigates the volatility of gold and oil prices in the Indonesian stock market during several geopolitical crises. The approach taken in analyzing this phenomenon includes the use of time series data on closing prices for gold, oil (Brent and WTI), and the Jakarta Composite Index (JCI). The main focus in this research is analysis of returns, time variation correlation, and volatility transmission between oil (Brent and WTI), gold, and the Indonesian stock market. The focus of this research is also to analyze how the transmission of volatility between the three variables occurs. The approach used to support this research is the GARCH (1,1) model. The research results found a relationship between the volatility of Brent oil, WTI and gold and the volatility of the Indonesian stock market, especially when observed over a long period.

This study also found that the volatility of Brent oil, WTI and gold had a positive or direct influence on Indonesian stock returns. Positive correlation between gold, Brent oil, WTI and the Indonesian stock market can reduce the effectiveness or no opportunity for portfolio diversification in certain crises. Investors tend to look for assets in the opposite direction to reduce risk. However, if the three variables are positively correlated, diversification is not effectively carried out. Positive correlation can also be an indicator of economic uncertainty or an unstable geopolitical situation. This uncertainty often makes investors look for protection or safe haven to maintain asset value. Therefore, gold price volatility can be used as an indicator reflecting the state of the stock market. The implications of this research support the concept of gold as a safe haven in crises and economic uncertainty.

The limitation of this research is that it only focuses on the Indonesian capital market in the Russia-Ukraine war and Israel-Hamas conflict periods. Further analysis could compare the impact of the Russia-Ukraine war and Israel-Hamas conflict crises on multi-countries by employing developing and developed countries. Apart from that, in order to maximize the study, it is recommended that future researchers extend the research period. Bearing in mind, this study was studied during the period of the Russia-Ukraine and Israel-Hamas conflict crises which have not yet ended, and newer geopolitical events also emerged.

REFERENCES

Ali, R., Mangla, I. U., Rehman, R. U., Xue, W., Naseem, M. A., & Ahmad, M. I. (2020). Exchange rate, gold price, and stock market nexus: A quantile regression approach. *Risks*, *8*(3), 86-105. https://doi.org/10.3390/risks8030086

ISSN : 1979-7400
E-ISSN : 2774-5163

Balcilar, M., Ozdemir, Z. A., & Ozdemir, H. (2021). Dynamic return and volatility spillovers among S&P 500, crude oil, and gold. *International Journal of Finance & Economics*, *26*(1), 153–170. https://doi.org/10.1002/ijfe.1782

Bonato, M., Gkillas, K., Gupta, R., & Pierdzioch, C. (2021). A note on investor happiness and the predictability of realized volatility of gold. *Finance Research Letters*, *39*(3), 101614. https://doi.org/10.1016/j.frl.2020.101614

Bourghelle, D., Jawadi, F., & Rozin, P. (2021). Oil price volatility in the context of Covid-19. *International Economics*, *167*(10), 39–49. https://doi.org/10.1016/j.inteco.2021.05.001

Chen, K., & Wang, M. (2019). Is gold a hedge and safe haven for stock market? *Applied Economics Letters*, *26*(13), 1080–1086. https://doi.org/10.1080/13504851.2018.1537469

Cui xiaozhong, Yen-Ku, K., Maneengam, A., Cong, P. T., Quynh, N. N., Ageli, M. M., & Wisetsri, W. (2022). Covid-19 and oil and gold price volatilities: Evidence from China market. *Resources Policy*, *79*(12), 103024. https://doi.org/10.1016/j.resourpol.2022.103024

Igbinovia, I. M., & Igbinovia, E. L. (2019). Oil price volatility and stock market returns in an emerging economy: Evidence from Nigeria. *Sriwijaya International Journal of Dynamic Economics and Business*, *20*(10), 193–206. https://doi.org/10.29259/sijdeb.v3i3.193-206

Marwanti, M. M., & Robiyanto, R. (2021). Oil and gold price volatility on Indonesian stock market in the period of COVID-19 pandemic. *Jurnal Manajemen dan Kewirausahaan*, *23*(2), 129–137. https://doi.org/10.9744/jmk.23.2.129-137

Mensi, W., Reboredo, J. C., & Ugolini, A. (2021). Price-switching spillovers between gold, oil, and stock markets: Evidence from the USA and China during the COVID-19 pandemic. *Resources Policy*, *73*(10), 102217. https://doi.org/10.1016/j.resourpol.2021.102217

Morema, K., & Bonga-Bonga, L. (2020). The impact of oil and gold price fluctuations on the South African equity market: Volatility spillovers and financial policy implications. *Resources Policy*, *68*(10), 101740. https://doi.org/10.1016/j.resourpol.2020.101740

Qian, Y., Ralescu, D. A., & Zhang, B. (2019). The analysis of factors affecting global gold price. *Resources Policy*, *64*(12), 101478. https://doi.org/10.1016/j.resourpol.2019.101478

Salisu, A. A., Gupta, R., Bouri, E., & Ji, Q. (2020). The role of global economic conditions in forecasting gold market volatility: Evidence from a GARCH-MIDAS approach. *Research in International Business and Finance*, *54*(12), 101308. https://doi.org/10.1016/j.ribaf.2020.101308

Singh, N. P., & Joshi, N. (2019). Investigating gold investment as an inflationary hedge. *Business Perspectives and Research*, *7*(1), 30–41. https://doi.org/10.1177/2278533718800178

Sui, M., Rengifo, E. W., & Court, E. (2021). Gold, inflation and exchange rate in dollarized economies – A comparative study of Turkey, Peru and the United States.

ISSN : 1979-7400
E-ISSN : 2774-5163

International Review of Economics & Finance, *71*(1), 82–99. https://doi.org/10.1016/j.iref.2020.08.014

Wen, D., Wang, G.-J., Ma, C., & Wang, Y. (2019). Risk spillovers between oil and stock markets: A VAR for VaR analysis. *Energy Economics*, *80*(5), 524–535. https://doi.org/10.1016/j.eneco.2019.02.005

ISSN : 1979-7400
E-ISSN : 2774-5163