NEXUS BETWEEN OIL, GOLD PRICE AND DXY INDEX ON INDONESIAN STOCK MARKET DURING GEOPOLITICAL EVENTS (2022 – 2024)

Jo Denie 1  
Surachman 2  
Nur Khusniyah Indrawati 3  
Mintarti Rahayu 4

ABSTRACT

Objective: The aim of this study is to observe the impact of oil, gold, and the DXY index on the Indonesian stock market during geopolitical events in 2022-2024.

Theoretical Framework: Rising political tensions also have a major impact on global currencies, financial market and commodity market. This event lead to uncertainty which increasing the investment risk. Hence, geopolitical events could affect stock return in capital market.

Method: The data used consists of daily Jakarta Composite Index (JCI) closing data, WTI daily closing prices, gold daily closing prices, and DXY closing data from 24 February 2022 – 31 December 2022 and 14 April 2024 – 30 April 2024. Data obtained form Bloomberg. The analysis technique used was GARCH (1,1).

Results and Discussion: The results showed that WTI oil price changes had significant positive effects on stock return in Indonesia. However, gold price changes had insignificant positive effects on stock returns in Indonesia during geopolitical events, while the DXY Index had insignificant, negative effects.

Research Implications: Investors and traders in Indonesia Stock Exchange should consider oil price changes for investing in stocks during geopolitical events.

Originality/Value: This study contributes to literatures regarding the stock market turbulence during geopolitical events and its effect toward stock return. The relevance and value of this research are evidenced by the insignificanct effect of gold and DXY toward stock return, while WTI has significant effect toward stock return.

Keywords: Indonesia Stock Exchange (IDX), Jakarta Composite Index (IDX), West Texas Intermediate (WTI), Gold, DXY.

RESUMO

Objetivo: O objetivo deste estudo é observar o impacto do petróleo, do ouro e do índice DXY no mercado de ações indonésio durante eventos geopolíticos em 2022-2024.

1 Doctoral Program in Management, Faculty of Economic and Business, Brawijaya University, Malang, East Java, Indonesia. E-mail: jodenie88@gmail.com Orcid: https://orcid.org/0000-0008-6284-3528
2 Department of Management, Faculty of Economic and Business, Brawijaya University, Malang, East Java, Indonesia. E-mail: surachman@ub.ac.id Orcid: https://orcid.org/0000-0002-5670-8572
3 Department of Management, Faculty of Economic and Business, Brawijaya University, Malang, East Java, Indonesia. E-mail: nur_khusniyah@ub.ac.id Orcid: https://orcid.org/0000-0002-3366-2818
4 Department of Management, Faculty of Economic and Business, Brawijaya University, Malang, East Java, Indonesia. E-mail: mintarti.rahayu@gmail.com Orcid: https://orcid.org/0000-0009-2161-7273
Nexus Between Oil, Gold Price and Dxy Index on Indonesian Stock Market During Geopolitical Events (2022 – 2024)

Referencial Teórico: As crescentes tensões políticas também têm um grande impacto nas moedas globais, nos mercados financeiros e nos mercados de matérias-primas. Este evento leva à incerteza que aumenta o risco de investimento. Consequentemente, eventos geopolíticos poderiam afetar o retorno das ações no mercado de capitais.

Método: Os dados utilizados consistem em dados de fechamento diários do Jakarta Composite Index (JCI), preços de fechamento diários do WTI, preços de fechamento diários do ouro e dados de fechamento do DXY de 24 de fevereiro de 2022 a 31 de dezembro de 2022 e de 14 de abril de 2024 a 30 de abril de 2024. Dados obtidos da Bloomberg. A técnica de análise utilizada foi GARCH (1.1).

Resultados e Discussão: Os resultados mostraram que as alterações nos preços do petróleo WTI tiveram efeitos positivos significativos no retorno das ações na Indonésia. No entanto, as alterações no preço do ouro tiveram efeitos positivos insignificantes nos retornos das ações na Indonésia durante eventos geopolíticos, enquanto o Índice DXY teve efeitos negativos insignificantes.

Implicações da Pesquisa: Os investidores e comerciantes da Bolsa de Valores da Indonésia devem considerar as alterações nos preços do petróleo para investir em ações durante eventos geopolíticos.

Originalidade/Valor: Este estudo contribui para a literatura sobre a turbulência do mercado de ações durante eventos geopolíticos e seu efeito no retorno das ações. A relevância e o valor desta investigação são evidenciados pelo efeito insignificante do ouro e do DXY no retorno das ações, enquanto o WTI tem um efeito significativo no retorno das ações.

Palavras-chave: Bolsa de Valores da Indonésia (IDX), Índice Composto de Jacarta (IDX), West Texas Intermediate (WTI), Ouro, DXY.
1 INTRODUCTION

The geopolitical tension between Russia - Ukraine, which started in February 2022, and Iran-Israel (February 2024) led to massive uncertainty in global commodity, financial, and stock markets, as well as international trade. The volatility in stock and commodity markets resulted in higher risks and profit (Syahri & Robiyanto, 2020). The global oil market saw the biggest impact of those conflicts, given the fact that Russia is the world’s second-largest oil producer and exporter, with an average production of 10.93 mb/d in 2023 International Energy Agency, (2024), while Iran is a large oil exporter, and the Strait of Hormuz (a strait between the Persian Gulf and the Gulf of Oman) is an important route in the world oil trade, with approximately 21 million barrels oil passing through the strait every day, 21% of global oil consumption (Energy Information Administration, 2023).

Any threat against those countries may cause oil prices to fluctuate, likely influencing stock market movements (Putra & Robiyanto, 2019). Research by Kanjilal & Ghosh, (2017) found that crude oil is the main energy source in the world and one of the most traded commodities. Robiyanto & Wahyudi, (2017) found that oil could be a safe haven for the Indonesian, Malaysian, Singaporean, and Thai capital markets. Aside from being a safe haven, oil can also be a means of hedging (Aloui et al., (2013) and Liu et al., (2020)). Al-Rousan et al., (2024) found that linear regression analysis suggest a positive influence of the Russia – Ukraine conflict, Brent oil on food price indices.

Aside from oil, gold is another commodity greatly affected by geopolitical tension, given its status as one of the most traded instruments worldwide. Gold offers low volatility and is considered a safe haven instrument (S. Kumar, 2017). Safe haven assets have negative correlation or no correlation at all with other assets in the time of market turmoil. Also, gold is relatively unaffected by inflation, no price intervention from the government, and has high liquidity (A. R. Putra & Robiyanto, 2019). Research by Yuliana & Robiyanto, (2021) found that gold can be a strong safe haven for the Indonesian stock market during the Covid-19 pandemic. On other hand, Putra et al., (2018) found that gold can effectively become a hedge for stocks in Indonesia and the portfolio resulted in a higher risk-adjustes performance of portfolio investment.
Rising political tensions also have a major impact on global currencies, including the US dollar/USD. The USD is an important ‘yardstick’ for commodities, with most of them priced in US dollars. The US dollar is also considered a hedging instrument during a stock market havoc (Hossain et al., 2024). Jalbert, (2014) found that the US dollar index was formed to estimate the value of the US dollar. USD can be used as a benchmark for currencies throughout the world, while the US dollar index can help investors in the process of hedging against USD risk. Research by Bai & Koong, (2018) found that oil price shocks significantly negative impact tradeweighted US dollar index and US market & Tiongkok has positive correlation just as the dollar index and the exchange rate.

Marwanti & Robiyanto, (2021) found that oil and gold price volatility did not affect stock returns during the Covid-19 pandemic. Robiyanto, (2018) found that the correlation between changes in global oil prices and ASEAN stock market returns changed according to stock and commodity market conditions. Raza et al., (2016) found that an unstable economy was caused by the vulnerability of developing stock markets to bad news. On the other hand, oil and gold prices significantly influence the stock market (Shabbir et al., 2020). Vogler, (2018) found that exchange rate volatility is a risk associated with exchange rate uncertainty in international trade and is driven by economic factors such as interest rates, inflation, etc. Changes in gold prices have a significant influence on stock price volatility, a positive dynamic correlation between the JCI and gold, and a negative correlation between the JCI and the exchange rate.

This study aims to determine the nexus of oil, gold, and DXY index on the Indonesian stock market during geopolitical tension in 2022 - 2024. It is hoped that the results of this research will help investors in making investment decisions in times of global uncertainty, in addition to contributing to previous literature.

2 LITERATURE REVIEW

2.1 OIL PRICE

The benchmarks used in international oil trade are Brent (Brent North Sea) and WTI (West Texas Intermediate) oil prices; instability or volatility in either of them might affect stock prices. Zhou et al., (2019) found that oil price volatility has a crucial impact on the stock market, since oil is one of the commodities widely distributed throughout the global industry. Changes in oil prices have different impacts on exporting and importing countries, and changes in WTI
oil prices positively affect KLCI and SET returns (Hersugondo et al., 2015). Cevik et al., (2020) found that changes in Brent oil prices significantly impact the Turkish stock market. Oil prices positively correlate with the energy sector during geopolitical risk (Figueiredo et al., 2022). Igbinovia, (2019) also found that oil price volatility had an insignificant positive effect on Nigerian stock market returns. In general, geopolitical risks contribute positively to oil prices (WTI, Brent, Dubai, and Nigerian Forcados spot oil prices) (Li et al., 2020).

In this study, we used WTI oil prices as a proxy. Based on the description above, we formulate the following hypothesis:

**H1: WTI oil prices had positive effect on stock returns during geopolitical tension in 2022-2024**

2.2 GOLD PRICE

Gold is a profitable instrument because its price tends to increase over time. In addition, during the time of volatility, gold is relatively more stable compared to other instruments, thanks to its status as a safe haven asset (Baur & Lucey, 2010). Surbakti et al., (2016) found that gold is a liquid form of investment, is widely accepted by many countries, and there are no binding government regulations regarding gold prices. Another research related to gold was carried out by Yuliana & Robiyanto, (2021), who found that gold had a negative correlation (safe haven) with the IDX mining sector index during the Covid-19 pandemic. Chiang, (2022) found that gold has a negative correlation with stocks with high geopolitical risk in all markets. The research results also show that changes in gold prices have a significant effect on stock price volatility due to the negative correlation between JCI and gold prices (Syahri & Robiyanto, 2020). Kumar, (2014) and Robiyanto et al., (2017) found a negative correlation between changes in gold prices and stock price volatility. Based on the description above, we formulate the following hypothesis:

**H2: Gold price had negative effect on stock returns during geopolitical tension in 2022-2024**

2.3 DXY INDEX

Exchange rate is one of the macroeconomic factors affecting stock returns and stock volatility. If the value of IDR depreciates against foreign currencies (like the US dollar), it will increase the amount of IDR required to pay foreign debt and trigger a spike in raw material
prices, leading to higher expenses and lower profit for companies (Yunita et al., 2018). Winarso, (2019) found that the attractiveness of the Indonesian stock market will drop if the IDR depreciates against the dollar, which can cause Indonesian stock prices to fall. Hossain et al., (2024) found that the Russia-Ukraine war negatively affected the exchange rate market. Arfaoui & Ben Rejeb, (2017) found the negative correlation between exchange rates and stock volatility. During the Covid-19, exchange rate has negative correlative and was a better alternative asset than gold (Arisandhi & Robiyanto, 2022). Based on the description above, we formulate the following hypothesis

**H3: Exchange rate had negative effect on stock returns during geopolitical tension in 2022-2024**

3 METHODOLOGY

The research was conducted using secondary data collected from Bloomberg. The data used consists of daily Jakarta Composite Index (JCI) closing data, WTI daily closing prices, gold daily closing prices and DXY closing data. The time periods analyzed in this research include: Russia-Ukraine War (24 February 2022 – 30 December 2022) and Iran-Israeli War (13 April 2024 – 30 April 2024). The independent variables (x) in this research were: oil price return, gold price return and DXY index return while the dependent variable (y) was the return of JCI.

The formula for calculating the WTI return was as follows:

\[
\Delta WTI_t = \frac{WTI_t - WTI_{t-1}}{WTI_{t-1}}
\]

where:

- \( \Delta WTI_t \): return of WTI in day t;
- \( WTI_t \): WTI oil price in day t;
- and \( WTI_{t-1} \): WTI oil price in t-1.

The formula for calculating gold return was as follows:

\[
\Delta Gold_t = \frac{Gold_t - Gold_{t-1}}{Gold_{t-1}}
\]

where:
The formula for calculating DXY return was as follows:

\[ \Delta DXY_t = \frac{DXY_t - DXY_{t-1}}{DXY_{t-1}} \]  

(3)

where:

\[ \Delta DXY_t: \text{return of DXY Index in day } t; \]
\[ DXY_t: \text{DXY Index in day } t; \]
and \[ DXY_{t-1}: \text{DXY Index in } t-1. \]

The formula for calculating JCI return was as follows:

\[ \Delta JCI_t = \frac{JCI_t - JCI_{t-1}}{JCI_{t-1}} \]  

(4)

where:

\[ \Delta JCI_t: \text{return of JCI in day } t; \]
\[ JCI_t: \text{JCI in day } t; \]
and \[ JCI_{t-1}: \text{JCI in } t-1. \]

This research was conducted using the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) analysis technique developed by (Bollerslev, 1986). The GARCH (1.1) model is the appropriate technique to use in this research because of the rapid changes in data over time. The data testing stage began with a stationarity test using the Augmented Dickey-Fuller Test. After the data was considered stationary, the GARCH analysis technique (1.1) was then run.

The basic GARCH model used in this research was as follows:

\[ y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \epsilon_t \]  

(5)

with:

\[ \Delta Gold_t: \text{return of gold in day } t; \]
\[ Gold_t: \text{gold price in day } t; \]
and \[ Gold_{t-1}: \text{gold price in } t-1. \]
Nexus Between Oil, Gold Price and DXY Index on Indonesian Stock Market During Geopolitical Events (2022 – 2024)

\[
\begin{align*}
\varepsilon_t &= \Phi_t \varepsilon_{t-1} + \ldots + \Phi_{t-p} \varepsilon_{t-p} + \eta_t \\
\eta_t &= \sigma_t \varepsilon_t \\
\sigma_t^2 &= \alpha + \beta_1 \eta_{t-1}^2 + \ldots + \beta_p \eta_{t-p}^2 + \gamma_1 \sigma_{t-1}^2 + \ldots + \gamma_q \sigma_{t-q}^2 \\
\varepsilon_t & \text{ was independent and unaffected by past data.}
\end{align*}
\]

4 RESULTS AND DISCUSSIONS

Before analysis using the GARCH (1.1) technique, the data was first tested for stationarity using the Augmented Dickey-Fuller test on the first level. The results of the stationary test are presented in Table 1.

Table 1
\textit{Results of Augmented Dickey-Fuller Test on the First Level Difference}

<table>
<thead>
<tr>
<th>Variable</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>R – WTI Oil</td>
<td>-9.82</td>
<td>0.0000***</td>
</tr>
<tr>
<td>R - Gold</td>
<td>-8.81</td>
<td>0.0000***</td>
</tr>
<tr>
<td>R - DXY</td>
<td>-12.77</td>
<td>0.0000***</td>
</tr>
<tr>
<td>R - JCI</td>
<td>-11.87</td>
<td>0.0000***</td>
</tr>
</tbody>
</table>

*** significant with level of confidence of 1%

The stationary test results showed that all variables used in the study were stationary and did not show any unit root, meaning that the data did not require special analysis, and the data testing could be continued with a normality test.

The results of the normality test are presented in Table 2 as follows:

Table 2
\textit{Results of the Normality Test}

<table>
<thead>
<tr>
<th>Variables</th>
<th>Jarque-Bera</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>JCI, WTI, Gold and DXY return</td>
<td>286.65</td>
<td>0.0000**</td>
</tr>
</tbody>
</table>

** not normally distributed

The results of the normality test using the JCI, WTI oil, Gold and DXY returns as variables showed that the data was not normally distributed as the probability value was < 0.0000. Since the data was not normally distributed, the next step was to test the data using the GARCH (1.1) analysis technique with the Generalized Error Distribution (GED) method.
Table 3
Results of the GARCH Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>z-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>0.00</td>
<td>0.43</td>
<td>0.6647</td>
</tr>
<tr>
<td>WTI</td>
<td>0.02</td>
<td>2.59</td>
<td>0.0489*</td>
</tr>
<tr>
<td>GOLD</td>
<td>0.00</td>
<td>0.01</td>
<td>0.9890</td>
</tr>
<tr>
<td>DXY</td>
<td>-0.12</td>
<td>-1.43</td>
<td>0.1522</td>
</tr>
<tr>
<td>C</td>
<td>0.00</td>
<td>0.61</td>
<td>0.5446</td>
</tr>
<tr>
<td>RESID(-1)^2</td>
<td>0.03</td>
<td>1.09</td>
<td>0.2767</td>
</tr>
<tr>
<td>GARCH(-1)</td>
<td>0.90</td>
<td>7.07</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Secondary data, processed, *significant 5%

The results of the GARCH (1.1) test showed an significant positive relationship between WTI oil prices and stock return and stock return in Indonesia during geopolitical turmoil, proving the H1 of this study. The results are in line with research by Le et al., (2023) found that WTI oil price volatility has positive correlation to a shock in oil production, inventories, US dollar index and VIX. Robiyanto et al., (2019) which found that crude oil prices had a positive effect on the JCI. Another research by Li et al., (2020) found that geopolitical risks contributed positively to oil prices (WTI, Brent, Dubai, and Nigerian Forcados spot oil prices). Oil prices have a positive correlation with the energy sector during geopolitical risk (Figueiredo et al., 2022). As mentioned earlier, WTI oil is the main energy source of most industries in the world Kanjilal & Ghosh, (2017) meaning that when world oil prices rise, world oil demand will also increase, boosting global economy. The fact that WTI oil prices had a positive effect on stock returns in Indonesia might be a positive sentiment for oil-related stocks, encouraging investors to invest their capital in IDX-listed oil companies, which should help boost stock prices and the JCI.

Table 3 results also showed the insignificant positive relationship between gold prices and stock return in Indonesia during geopolitical events, disproving the H2 of this study. During the study, it was found that gold return had a positive relationship with stock return, meaning that gold could not be used as a safe haven during geopolitical turmoil and it could only be used as diversification asset. This is in line with the results of research by Tarchella et al., (2024) which found that gold could be used as a diversification asset for equity investment in the G7 equity market in all market conditions. Gold and bitcoin are also considered as diversification assets for BRICS countries. So when the price of gold rises, the JCI return will also increase, positively impacting stocks related to gold. Then, research by Arisandhi & Robiyanto, (2022) found that gold has positively correlated with stock price.
The study also found that the DXY return had an insignificant negative effect on stock return in Indonesia, proving the H3 of the study. This is in line with research by Hossain et al., (2024) which found that the Russia-Ukraine war hurt the exchange rate market. The conflict between Russia – Ukraine put pressure on exchange rate and caused rapid depreciation (Xu et al., 2023). Grebe et al., (2024) found that the Russia-Ukraine war had a negative impact on the foreign exchange market. Exchange rate has negative correlation with stock price (Arisandhi & Robiyanto, 2022). Robiyanto et al., (2019) also found that the IDR/USD exchange rate had a negative coefficient and had a significant effect on the JCI. In other words, when the USD/IDR appreciates, the JCI will weaken. The US dollar is one of the riskier fundamental economic indicators for investors because when the US dollar gains some steam, it will hurt companies’ profitability and cause negative sentiment for investors. If this happens, investors usually choose to wait and see or take some profit, causing the JCI to decline.

5 CONCLUSION

The aim of this study is to observe the impact of oil and gold prices, as well as the DXY index on Indonesian stock market during geopolitical events in 2022-2024. The results showed that during geopolitical events (2022-2024), WTI oil had significant, positive effect on stock return in Indonesia. However, the gold prices had insignificant positive effects on stock return in Indonesia, while the DXY Index had insignificant, negative effects, proving that gold could be used as a diversification asset during geopolitical events. Investors and traders should consider WTI price changes prior doing stock investment in Indonesia.

The researcher’s suggestion is as follows: during the time of uncertainty, investors should look for stocks related to WTI oil and gold, given their huge potential; if commodity prices increase, those stocks are likely to rise, pushing up the JCI. On the other hand, when the IDR exchange rate weakens, investors should avoid companies that purchase raw materials using IDR.

Since the data used in the study was not normally distributed, it is recommended that more sophisticated methods should be used in future research. Apart from that, it would be better to compare the influence of WTI oil, gold, DXY on the JCI before geopolitical events, during geopolitical events and after geopolitical events.
REFERENCES


Nexus Between Oil, Gold Price and Dxy Index on Indonesian Stock Market During Geopolitical Events (2022 – 2024)


Nexus Between Oil, Gold Price and Dxy Index on Indonesian Stock Market During Geopolitical Events (2022 – 2024)


---
