

Navigating Market Volatility: The Role of Gold, Crude Oil, and COVID-19 on the Stock Price

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Abstract

This study aims to analyze the influence of global gold prices, crude oil prices, and daily COVID-19 cases on the Indonesian Composite Index (IHSG) before, during, and after the COVID-19 pandemic. The study consists of three independent variables: global gold prices, crude oil prices, and daily COVID-19 cases, with one dependent variable: the IHSG. The data was taken from 2018 to 2023, covering the periods before, during, and after the pandemic. The data processing is divided into four periods: before, during, and after the pandemic, up to the overall period. This paper used the Quantile Regression 0.75 and Generalized Linear Model (GLM) research methods due to the presence of extreme outliers that prevented the data from meeting normality requirements. By using Quantile Regression 0.75 and GLM, data normality can be ruled out. Both research methods showed similar significant results. Gold has a positive effect on the IHSG, and crude oil has a larger coefficient than gold. Meanwhile, COVID-19 has a significant but negative effect, with a small coefficient, suggesting that the daily number of COVID-19 cases has no impact on the IHSG. These findings have practical implications for understanding the dynamics of the IHSG, engaging the reader's interest in the study's relevance.

Keywords: Gold price, Crude Oil, COVID-19, Stock price, Indonesia.

JEL G30, G31, G33

1. Introduction

For years, gold has been considered one of the safest investment options. Gold has long served as a medium of exchange and a store of value. Gold prices fluctuate frequently due to various variables in the evolving global economy, such as inflation, interest rates, geopolitical uncertainty, and physical demand. Gold price movements have been particularly significant during several global economic crises. For example, the 2008 global crisis resulted from the bankruptcy of Lehman Brothers, the world's largest investment bank, which in turn impacted other businesses. At that time, gold prices soared to \$1,800/oz. This prompted investors to shift to gold from the slumping bond market. Another example is the COVID-19 pandemic. The global economy experienced a severe crisis due to the spread of the virus. This led to a stock market crash, reduced purchasing power, and social restrictions. Amidst the downturn in almost all economic sectors, gold emerged as the most attractive instrument, reaching an all-time high

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of \$2,000/oz. Therefore, this precious metal has been dubbed a safe-haven asset. A safe haven asset tends to strengthen when other assets weaken. Therefore, during an economic crisis where almost all sectors collapse, gold becomes a "rescue" asset because it has an inverse relationship to the growth of other instruments. This makes gold more attractive than other investment instruments such as stocks, bonds, or even property amidst uncertain economic turmoil. Furthermore, the shift in global gold prices in recent years has attracted the attention of many investors and market analysts, particularly due to its impact on the share prices of companies operating in the gold mining industry.

Gold mining plays a crucial role in the Indonesian economy. In Indonesia, the gold industry plays a crucial role in the economy because it contributes to state revenue and creates jobs. Meanwhile, the United States is known as one of the world's largest gold producers, with several companies listed on the local stock exchange. It is therefore not surprising that gold company stocks are an attractive investment for many investors. Therefore, investors, companies, and policymakers must understand how global gold prices and company share prices in each country are related. Several previous studies have shown a significant relationship between gold prices and company stock prices. However, these results often vary depending on market characteristics and the economic context of each country. For example, while some studies indicate that gold prices can positively influence company stock prices, others show that this relationship can be negative or insignificant. This difference suggests the need for further research to explore the factors influencing this relationship in Indonesia. What distinguishes this study from previous studies is that it focuses on whether there is a strong relationship between global gold prices and the stock prices of gold companies in Indonesia, given that global gold prices are pegged to the USD. Therefore, global gold price volatility can also be a measure of the strength of the Indonesian Rupiah (IDR).

Similarly, crude oil has become a key commodity in the financial world. [Mellquist and Markus \(2007\)](#) stated that dependence on oil in many countries is increasing as a result of growing industrialization. [Yan \(2012\)](#) asserted that petroleum, as the leading global energy source, plays a crucial role in the development of modern industry and the economy; therefore, it is not surprising that countries in the world highly contest petroleum. Oil is a major commodity because it has a tremendous demand value, and in 2022, oil will contribute 82% of global primary energy. In 2008, oil demand increased but was not balanced by the existing supply, so that oil prices reached an all-time high. In 2009, world oil demand recovered substantially. This is due to the increasing demand and consumption of crude oil in developing regions with strong economies, such as China, which is a large consumer of world energy. However, in mid-2014, global oil prices fell sharply due to increasingly sluggish global economic activity, and the decision of the Organization of the Petroleum Exporting Countries (OPEC) not to limit production. Oil prices eventually reached a 13-year low in 2016, only to recover in the fourth quarter of 2018. That same year, oil prices fell again due to oversupply and weaker-than-expected demand. OPEC then decided to limit production, leading oil prices to rise to higher levels in the first quarter of 2019.

At the end of 2019, the first case of COVID-19 was reported in Wuhan, China. The virus spread quickly and disrupted the global economy. Due to its widespread spread, experts predicted that the virus would become a highly impactful pandemic. As a result, many countries lost at least 3% of their gross domestic product (GDP) in 2020. The virus was identified on December 31, 2019, and declared a pandemic in March 2020 by the World Health Organization (WHO). After being declared a pandemic, COVID-19 rapidly spread from Asia to Europe and the Americas.

Many countries experienced economic recessions due to restrictions on outdoor activities. Economic development and growth in various countries also showed varying patterns. The WHO recorded at least 637 million COVID-19 cases worldwide, with 6.5 million deaths, as of November 28, 2022 (WHO, 2023). Since then, the economic downturn has plunged many countries into recession and increased the risk of economic depression. The economic uncertainty caused by this outbreak has also increased, accompanied by unprecedented shocks in financial and energy markets.

In May 2020, crude oil prices plummeted unexpectedly, reaching a four-year low. The decline in crude oil prices coincided with the spread of the COVID-19 virus. However, in addition to crude oil demand, crude oil supply could also be affected. The worsening pandemic situation in the Middle East was also unavoidable, impacting crude oil exports. As a result, an oil oversupply arose. Investors worldwide reported that the US stock market experienced highly volatile price fluctuations during that period. Another important factor was gold. Oil and gold are considered important factors in selecting investments in the stock market ([Zeinedini et al., 2022](#)). This study will discuss and examine the effect of oil and gold price fluctuations on the stock markets in Indonesia and Australia. Previous research has also examined the impact of oil and gold price fluctuations on various economic indicators. Several researchers have found a relationship between oil prices, inflation rates, and economic growth rates in oil-importing and oil-exporting countries (Saudi Arabia, Canada, China, Germany, India, Italy, Iraq, Japan, Korea, the UK, and the US). Furthermore, a dynamic relationship exists between gold prices, currency exchange rates, and crude oil prices in the BRICS countries. [Azimli \(2020\)](#) analyzed the relationship between oil prices and nominal exchange rates related to the value of the US Dollar against five major currencies used in global trade, namely the British Pound, Canadian Dollar, Japanese Yen, Euro, and Swiss Franc.

ASEAN, a legally established multilateral organization consisting of ten sovereign states in Southeast Asia, aims to enhance political and economic cooperation among its member states. This organization enables intergovernmental cooperation and allows for integration in the economic, political, military, educational, and socio-cultural aspects of its members. This multilateral organization as a whole covers almost 8.5% of the world's population, with 673.9 million people and 3.5% of GDP (3.4 trillion dollars). This makes ASEAN a multilateral organization with good growth at that time. America, as one of the world's largest producers of gold and crude oil, was also not spared from the economic downturn during the pandemic. ([Ashraf, 2020](#)) shows a negative correlation between the number of confirmed cases and the decline in the US stock market (S&P 500) since January 2020. So far, the pandemic has created uncertainty that will have a positive or negative impact on gold market volatility. ([Azimli, 2020](#)) examines the impact of COVID-19 on the risk-return relationship using a quantile regression approach. Due to lockdowns and the spread of COVID-19, global oil demand has declined. The International Energy Agency (IEA) estimates that global oil demand will fall by 30% in April 2020, followed by a second year-on-year decline of 26 million barrels per day in May 2020.

The oil and stock markets are interdependent, allowing volatility to easily shift from the stock market to the oil market and vice versa ([Rotinsulu et al., 2021](#)). A substantial body of empirical literature has examined the relationship between the oil and stock markets, yielding mixed results. Conversely, when inflation is high and the stock market declines sharply, gold serves as a safe haven ([Ghazali et al., 2022](#)). International investors have been encouraged to seek alternative investments such as oil and gold due to increased international stock market

integration ([Robiyanto et al., 2020](#)). On the other hand, investment in gold and oil has increased rapidly following financialization.

Furthermore, market participants who have recently relied on these assets for investment have realized that there is no strong relationship between the stock market and the commodity market. Therefore, retailers and fund managers have considered these strategic commodity assets in their stock portfolios to reduce risk while also increasing expected returns. They have also hedged their positions against drastic stock price movements ([Ghazali et al., 2020](#)). This has prompted international investors to seek alternative investments such as oil and gold due to the increasing integration of international stock markets. On the other hand, investment in gold and oil has increased rapidly following financialization. It is important to note that in recent years, the prices of commodities such as gold and oil have become more susceptible to stock market fluctuations. Consequently, for portfolio risk management and fund allocation, monitoring the cross-market correlation between these two strategic commodities and the stock market is crucial.

The COVID-19 pandemic has impacted the global economy, including Indonesia. Indonesia is feared to experience a COVID-19 pandemic due to its negative impact on the Indonesian economy, and investors will seek to shift their investments to safe-haven assets such as gold or other commodities. The COVID-19 pandemic has caused the Indonesian Composite Index (IHSG) to decline. The author only considers the Indonesian stock index (IHSG) for several reasons. First, the current global gold price is pegged to the US dollar, the currency of the United States. All the commodity pair is gold against the dollar (XAU/USD), so there is a strong correlation between gold and the dollar, as is the case with crude oil. These two commodities play a crucial role in the investment world, as the strengthening of the IDR against the dollar often indicates a strengthening of the IHSG. Second, considering the economic conditions of Indonesia, the author will examine whether Indonesian stocks are also strongly linked to global gold prices. Gold, as a safe-haven asset, plays a crucial role when a country experiences inflation. Rising gold prices tend to have a negative correlation with the stock market due to market behavior shifting from the stock market to gold commodities when gold prices rise. Third, because oil is one of America's largest commodities, oil trading is a crucial sector in the American capital market, influencing global capital markets. Therefore, the commodity chosen is highly influential during economic fluctuations amid geopolitical, global health, and other crises.

The Indonesian Composite Index (IHSG) is a key indicator for illustrating the performance of the Indonesian stock market. Various factors, both domestic and international, heavily influence IHSG movements. Some factors frequently linked to IHSG fluctuations include global gold prices, crude oil prices, and global events such as COVID-19. Gold is often used as a safe-haven asset during times of economic uncertainty in the capital market. Meanwhile, oil prices also influence global economic stability and trigger global market reactions, including in Indonesia. Furthermore, the COVID-19 pandemic that emerged at the end of 2019 had a significant impact on the global economy, including Indonesia, significantly impacting the IHSG. Although the influence of each variable on the IHSG has been widely discussed in previous research, there remains some uncertainty and discrepancies in the results, particularly in this study, which examines IHSG fluctuations during COVID-19. Therefore, it is imperative to conduct further research to empirically identify the influence of global gold prices, crude oil prices, and daily COVID-19 cases on the IHSG.

2. Literature Review

Intrinsic Theory. In investment analysis, a key idea is the theory of intrinsic value, which states that every asset, including stocks, has a fundamental value, or "intrinsic value." This value can be identified from its fundamental characteristics, such as earnings, future cash flows, or the value of the company's underlying assets. This theory was developed to help investors determine whether an asset's market price truly reflects its true value. If an asset's market price is lower than its intrinsic value, the asset is considered undervalued and worth purchasing. Conversely, if an asset's market price is higher than its intrinsic value, the asset is considered overvalued. In the case of gold companies, the theory of intrinsic value emphasizes that a company's performance and the value of the gold it produces contribute to the company's stock value. Global gold prices are a key factor influencing the profits of gold mining companies, which in turn impact their stock value. Changes in global gold prices play a significant role in determining the intrinsic value of gold companies, especially since gold is the primary commodity they produce ([Phillips & Pohl, 2024](#)). Thus, the theory of intrinsic value is an important foundation for understanding how external factors, such as gold prices, affect stock performance and valuation in the capital market.

Supply and Demand Theory. One of Adam Smith's most fundamental economic theories is the theory of supply and demand, which explains how the price of goods or services is determined in the market based on the interaction of supply and demand. In this theory, the price of goods will change until producers reach equilibrium, which is the point at which the quantity demanded by consumers equals the quantity supplied by producers. Demand refers to the willingness and ability of buyers to purchase goods at a given price level over a given period. Assuming supply remains constant, the price of goods tends to rise when demand for those goods increases. Supply refers to the quantity of goods available for sale by producers at various price levels. Prices tend to fall when supply increases while demand remains constant. Supply and demand significantly influence the price of gold itself. When demand increases and supply decreases, the price of gold will increase. Conversely, if supply increases and demand decreases, the price of gold will fall. When supply and demand are in balance, this is called equilibrium.

Portfolio Diversification Theory. Diversification theory is a concept in strategic management that proposes that a company can reduce risk and improve financial performance by expanding its business activities into different products, markets, or even industries. This theory is based on a theory developed by Harry Markowitz, an American economist. In other words, a company does not rely solely on a single product or market but instead spreads risk across various business areas. Gold itself plays a crucial role in portfolio diversification, primarily due to its unique characteristics as a safe haven asset. Safe haven assets are assets that tend to maintain or even increase in value during times of financial market uncertainty or crisis. In the context of portfolio diversification, gold serves as an instrument to hedge investments and reduce overall portfolio risk, especially when risky assets, such as stocks, experience price declines. The main concepts of portfolio diversification are (1) reducing specific risks directly related to a particular asset or company, such as a decline in stock prices. Portfolio diversification can minimize the risk of loss on one asset because gains in other assets can offset losses; (2) Reducing market risks, such as the influence of financial markets, global economic downturns, or changes in interest rates. While portfolio diversification cannot wholly eliminate market risk, market fluctuations can be mitigated by holding different assets, such as bonds, commodities, or property. (3) Correlation between one asset and another, in which diversification is most

effective if one asset has a negative correlation with another. A negative correlation is a relationship between two variables that move in opposite directions. For example, when gold prices rise, stock prices tend to fall.

Several researchers have researched topics similar to the Influence of World Gold Prices, Crude Oil, and COVID-19 Cases on the Indonesian Composite Index (IHSG). ([Munawaroh, 2019](#)) explains that Bank Indonesia interest rates, the IDR exchange rate, world oil prices, and world gold prices have a positive effect on the IHSG. However, another variable, the inflation rate, negatively impacts the IHSG because rising inflation indicates an average economic downturn, which impacts the IHSG's value. In this study, the IDR exchange rate is the most dominant variable influencing the IHSG, so investors need to consider macroeconomic factors, especially the IDR exchange rate, when making decisions in the Indonesian capital market. [Fairuzie et al. \(2022\)](#) stated that Earnings per Share (EPS) significantly influences the shares of companies operating in the mining sector, while global gold prices and inflation do not affect mining company share prices. ([Nurhasanah et al., 2021](#)) examined the effect of global oil prices, inflation rates, the IDR exchange rate, the Dow Jones Index, and the Shanghai Composite Index on the IHSG from 2015 to 2019. This study showed that global oil prices, global gold prices, the Dow Jones Index, and the Shanghai Composite Index had a significant positive effect. Meanwhile, the inflation rate and the IDR exchange rate negatively impacted the IHSG. Domestic macroeconomic factors and global economic indicators significantly influence the Indonesian Composite Index (IHSG), so investors need to consider these influences before making investment decisions in the IHSG capital market.

A similar study was conducted by [Septiana et al. \(2021\)](#), which examined the effect of oil, gold, and inflation prices on the IHSG from 2018 to 2020. This study showed a positive and significant effect on global oil prices. Inflation also had a positive effect, but the results were insignificant. In contrast, gold showed a negative but significant effect on the IHSG. [Tuna and Tuna \(2022\)](#) examined whether there is a long-term relationship between COVID-19 and the prices of gold, crude oil, and stock and found that there is a long-term causal relationship between the number of COVID-19 cases, gold, and crude oil. However, the short-term relationship is only temporary. Furthermore, [Priyana et al \(2024\)](#) found that gold has both short-term and long-term positive effects. Meanwhile, the IDR exchange rate has a negative effect on the Indonesian Composite Index (IHSG), but only in the short term. Crude oil, coal, and inflation do not significantly affect the IHSG in either the long or short term. Gold, as a safe-haven asset, plays a crucial role in a crisis, as stated by [Mensi et al. \(2022\)](#). In their research, gold has a negative correlation with the S&P 500 stock price index.

Meanwhile, oil has a positive correlation with the S&P 500 and other stock markets. This can be a consideration for investors whether to take advantage of the diversification offered by gold or hedge with crude oil. A similar study was also conducted by [Sinlapates and Chancharat \(2024\)](#), who examined how fluctuations in global gold and oil prices affect several stock indices in Southeast Asia, such as Indonesia, using Quantile Regression to capture heterogeneity in the overall distribution of market returns. At the low quantile, gold and stocks tend to rise in weak market conditions, while crude oil tends to depress stock returns. At the high quantile, the effect of gold is insignificant, indicating that gold is less attractive during bullish stock markets. In oil, the effect is weakening and even moving in a positive direction because the energy sector can provide benefits when oil prices are high.

3. Research Method

According to [Sugiyono \(2019\)](#), a research object is anything, or an attribute, or value of an activity that has certain variations determined by the researcher to be studied and then conclusions drawn. The research objects in this study, global prices, oil prices, and COVID-19 cases, are of significant importance as independent variables, with the average stock exchange price of companies in Indonesia and the United States as the dependent variable. Their influence and interplay will be thoroughly examined in this study, providing valuable insights into their relationships. Research data will be collected through the Refinitiv database, which contains daily price data related to the research variables and indicators. Additionally, daily COVID-19 data will be retrieved from the Our World in Data database, affiliated with Refinitiv. The data analysis method used in this study is not just any method, but the advanced and rigorous linear regression. Linear regression is a statistical method for evaluating the relationship between independent variables (gold prices, oil prices, and COVID-19) and the dependent variable (the average price of the Indonesian Composite Index). The purpose of this analysis method is to examine the influence of global gold prices on the stock prices of gold companies in Indonesia. By using historical data and applying linear regression, the relationship between global gold prices and the stock prices of gold companies will be identified.

The data was then tested for significance using a t-test or F-test, and the coefficient of determination (R^2) was examined. Furthermore, correlation analysis was used to determine whether the related variables were positively or negatively correlated. It is possible that the data was not normally distributed or did not meet the classical assumption test due to extreme outliers or high volatility. Therefore, the researchers processed the data using not just one, but two advanced statistical methods-quantile regression and a Generalized Linear Model (GLM), which eliminated the classical assumption test, ensuring the validity of the data processing results ([Hasibuan et al., 2024](#); [Saidi et al., 2021](#)). Historical data collected from Refinitiv included 1,460 daily data points on gold, oil, and the Indonesian Composite Index (IHSG) from 2018 to 2023. Furthermore, 774 daily data points on COVID-19 cases were collected from the time COVID-19 first entered Indonesia (March 9, 2020) until the WHO declared COVID-19 no longer a pandemic (May 15, 2023). After being processed using Excel, the author calculated the data according to the variables by calculating the mean, median, mode, standard error, standard deviation, kurtosis, and skewness.

Table 1. Descriptive Statistics

	Gold	Oil	Covid-19	IHSG
Minimum	1173,5601	19,33	0	3937,63
Maximum	2077,16	127,98	389727,00	7318,02
Mean	1662,06	72,01	21621,51	6280,94
Median	1757,43	72,59	1413,00	6321,88
Mode	1324,00	69,46	0,00	6209,12
Standard Deviation	257,00	18,63	53663,89	633,29
Standard Error	6,73	0,49	1404,45	16,57
Kurtosis	-1,19	0,35	20,11	0,67
Skewness	-0,47	-0,03	4,26	-0,92

The table above shows the gold variable as an independent variable that influences the IHSG variable as the dependent variable. The descriptive analysis results show that the minimum gold price is 1,173.56, which is the lowest price during the selected period. The maximum gold price is 2,077.16, which indicates the highest gold price during the specified period. The average value is 1,662.06. The median is 1,757.43, which is the middle value of the gold itself after being sorted from lowest to highest. The mode shows a value of 1,324, which is smaller than the mean and median. The resulting mode indicates asymmetry of skewness to the left. The standard deviation is 257, which indicates the spread of the data from the average. This value is quite significant considering the gold price in the data collected is quite volatile. The standard error is 6.73, which indicates a relatively stable average estimate of the data. In terms of kurtosis, gold shows a value of -1.19, indicating a more evenly distributed data distribution, with extreme outliers rare due to the relatively low volatility of gold prices. Skewness is -0.47, indicating the possibility of minimal data values. This calculation reflects the gold price's reaction to the crisis and pandemic. This allows the gold price to fluctuate between its minimum and maximum values of \$900. This is consistent with gold's nature as a safe-haven asset, where market participants prefer gold investment during times of economic uncertainty. This is what drives gold prices up due to surging market demand, in accordance with the laws of supply and demand.

Crude oil, a vital commodity in the economy, was also impacted by the pandemic. The minimum value was 19.33, the lowest crude oil price during the selected period. The highest price was 127.98, the highest crude oil price during the selected period. The difference between the lowest and highest prices is significant. The average price obtained was 72.01. The mode resulting from the Excel calculation is 69.46, indicating that this price is the most frequently occurring during the specified period. The standard deviation of crude oil itself is 18.63, indicating moderate price fluctuations. The standard error of 0.49 is a benchmark that oil prices are not affected by extreme fluctuations. Kurtosis shows a value of 0.49, close to 0. This indicates a few extreme outliers compared to the normal distribution, but they are not significant, and the data is still considered normally distributed. The Skewness calculation results for crude oil show a value of -0.03, indicating a nearly normal distribution and no data bias, as it is close to 0. Oil price movements can be categorized as fluctuating but not significant. The difference between the minimum and maximum values of crude oil indicates this. Several geopolitical policies requiring companies to limit their activities, such as physical distancing, have caused oil prices to fall due to reduced demand, especially when COVID-19 was initially declared a pandemic.

The minimum value for COVID-19 is 10, indicating the lowest daily number of COVID-19 cases. The maximum value is 389,727, which is the highest peak of daily COVID-19 cases reported in Indonesia. The average daily number of Indonesians infected with COVID-19 is 40,785. The median value for the COVID-19 variable is 17,593/day. The most frequently occurring mode value is 10, as this occurred at the beginning of the pandemic. The standard deviation shows a figure of 68,212.38, indicating an extensive distribution of data due to the presence of quite a number of days with very low and very high cases. The calculated standard error value is 2,451.84, which is quite large due to the very high daily case fluctuations. The kurtosis value is 9.79, very far from 0. This is due to the many extreme outliers that occur with an unusually high spike in cases. Skewness also shows a positive figure of 3.08. This figure indicates a range of days with low cases but many days with very high cases, making the data distribution asymmetric.

The IHSG, as Indonesia's stock exchange, was also undoubtedly impacted by the pandemic. This is demonstrated by its lowest price, which reached 3,937.63. Its maximum value was 7,318.02, indicating recovery or market optimism regarding the crisis. The average price for the selected period was 6,280.94. The median for the dependent variable, the IHSG, was 6,321.94, sorted from lowest to highest. The most frequently occurring price was 6,209.12. The IHSG's standard deviation, at 633.29, is quite significant, and this figure is considered reasonable in the stock market context. The IHSG's standard error was 16.57, which is relatively small compared to the standard deviation, and the IHSG's price is relatively stable and representative of all data. The IHSG kurtosis value is above 0, at 0.67, indicating the IHSG distribution is slightly steeper than the normal distribution. There are a few extreme outliers, but they are not striking. The skewness value is negative at -0.92, indicating there were several days with profound IHSG declines (extreme low values), but the majority of the data tends to be higher.

4. Finding & Discussion

The overall normality test did not indicate any normally distributed variable data. According to the normality test criteria, a normal variable is one with a value >0.05 . Several factors contribute to the non-normal distribution of data, including excessive data. In the observed data, there were at least 1,460 daily data points per variable, resulting in a significant amount of data to process. Furthermore, there is the possibility of extreme outliers in the variables, causing the data to be non-normally distributed.

Table 2. Normality Test

Variable	Obs	Skewness	Kurtosis	adj chi2(2)	Prob>chi2
ihsg_	1,460	0.000	0.000	.	0.000
gold_	1,460	0.000	0.000	.	0.000
oil_	1,460	0.647	0.015	6.060	0.048
covid19	1,460	0.000	0.000	.	0.000

In the overall OLS data processing results for the selected period, gold has a coefficient of 0.191 with a significant p-value, meaning that every 1-point increase in gold will be followed by a 0.191-point increase in the IHSG, assuming other variables remain constant. Likewise, oil has a coefficient of 28.238 with a significant p-value, meaning that a 28.238 increase will follow every 1-point increase in crude oil in the IHSG. This is unlike COVID-19, which has a negative coefficient of -0.001. Although negative, COVID-19 has a significant p-value, so it is often associated with a 1-point increase in COVID-19 being followed by a 0.001 decrease in the IHSG. Although small, this proves that the increase in the number of COVID-19 cases on the IHSG has a negative impact because it increases investor concerns about market uncertainty.

Table 3. OLS Result

Variables	ihsg
gold_	0.191*** (0.0373)
oil_	28.24*** (0.502)
covid19	-0.00142***

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	(0.000177)
Constant	3,961*** (66.17)
Observations	1,460
R-squared	0.698

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In the results of the multicollinearity test on the overall data in the specified period, no indication of multicollinearity was found because the results shown in the multicollinearity test were at 1.08, which is < 5 . A positive and strong autocorrelation was found in the overall data. The Durbin-Watson value is very low, approaching 0, namely 0.052, indicating that the error in the period is closely related to the error in the previous period, so it does not meet the ideal autocorrelation test pass rate of 2. The heteroscedasticity test conducted on the overall data also failed to meet the pass rate requirements, with a heteroscedasticity number of 0.0035. This indicates that homoscedasticity occurs in the research model; namely, there is a possibility that the error variance is not uniform at all levels of the independent variable.

Table 3. Specification Testing Result

	VIF	1/VIF
gold	1.105	.905
covid19	1.092	.916
oil	1.055	.948
Mean VIF	1.084	.

Durbin-Watson d-statistic (4, 1460) = 0.0525433

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of ihsg_

chi2(1) = 8.52

Prob > chi2 = 0.0035

Pre-pandemic. Quantile regression, a statistical technique that estimates the conditional median and other quantiles of a response variable, was used in this analysis. The 75% quantile regression results showed that gold and crude oil significantly influenced the decline in the IHSG when both independent variables increased. The 75% quantile regression results showed a coefficient for gold of -0.612. This figure is significant with a P-value of < 0.01 , indicating that every 1-point increase in gold contributed to a 0.612-point decline in the IHSG. Similarly, for crude oil, the coefficient was -9.430, indicating that every 1-point increase in crude oil prices contributed to a 9.430-point decline in the IHSG. This regression result was highly significant with a P-value of < 0.01 .

During the pandemic. The 75% quantile regression results showed a coefficient of 0.210 for gold, although not significantly. This suggests a potential role for gold as a safe haven asset during times of stock market weakness, rather than during periods of bullishness. Crude oil, on the other hand, shows a highly significant p-value < 0.01 , with a coefficient of 30.473, indicating that every 1-point increase in oil prices leads to a 30.473-point increase in the IHSG. A significant coefficient also exists for the COVID-19 variable, with a coefficient of -0.001,

indicating that every 1-point increase in COVID-19 cases leads to a 0.001-point decrease in the IHSG.

Pre-pandemic. Data processing of the 75% quantile regression on post-pandemic data shows that gold has a significant coefficient of 1.874, indicating that every 1-point increase in gold prices leads to a 1.874-point increase in the IHSG. Crude oil has a positive but statistically insignificant coefficient. The coefficient for the crude oil variable is 6.816, indicating that a 1-point increase in crude oil prices leads to a 6.816-point increase in the IHSG.

Overall observation period. A 75% quantile regression on the overall data over the specified period shows that all independent variables are highly significant. Gold has a significant result with a coefficient of 0.100, meaning that every 1-point increase in gold will lead to a 0.100-point increase in the IHSG. Similarly, crude oil has a significant value of 24.505. This indicates that a 1-point increase in crude oil will lead to a 24.505-point increase in the IHSG. COVID-19 also has a significant value, but with a negative coefficient of -0.001, meaning that every 1 case of COVID-19 will lead to a 0.001-point decrease in the IHSG

Table 4. Quantile Regression Results

Variables	Pre-Pandemic	During Pandemic	Pra-Pandemic	Overall Period
gold_	-0.613*** -0.159	0.21 -0.163	1.875*** -0.459	0.101*** -0.0264
oil_	-9.431*** -2.525	30.47*** -0.663	6.817* -3.77	24.51*** -0.355
covid19		-0.00116*** -0.00023		-0.00159*** -0.000125
Constant	7,836*** -354.6	3,924*** -293.4	2,757** -1,075	4,636*** -46.78
Obs.	532	774	154	1,460

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

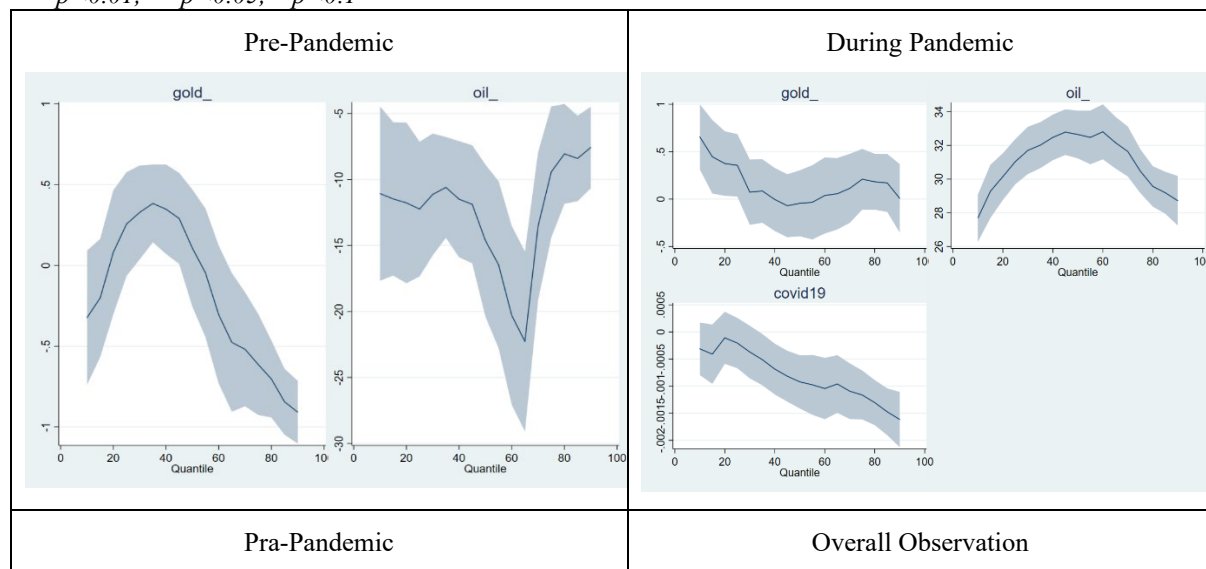




Figure 1. Quantile Regression Result

Robustness Check

Table 5. GLM Regression Results

Variables	Pre-Pandemic	During Pandemic	Pra-Pandemic	Overall Period
gold_	-0.0179	0.231*	1.767***	0.191***
	0.123	0.126	0.023	0.037
oil_	-10.138***	30.407***	11.294***	28.239***
	1.95	0.512	1.889	0.502
covid19		-0.001***		-0.001***
		0.0000		0.0000
Constant	7095.92***	3617.741***	2498.194***	3960.609***
	273.78	226.721	539	66.169
Chi-square	35.942	3630.835	66.986	3370.392
Akaike crit. (AIC)	7359.987	11183.717	1,939	21237.345
Obs.	532	774	154	1,460

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The Influence of Global Gold Prices on the Indonesian Composite Index. In the overall quantile regression and Generalized Linear Model (GLM) test results, gold had a significance of $P < 0.00$, indicating absolute importance, and its importance is beyond question. These tests are statistical methods used to analyze the relationship between variables, specifically gold prices and the IHSG. In the overall test data, gold had a positive coefficient. However, the value was not significant, suggesting that increases in gold prices would not significantly impact the Indonesian Composite Index (IHSG) in the long term. [Rahayu \(2023\)](#) stated that global gold prices did not affect the IHSG. It should be noted that gold itself is a safe haven asset, acting as a hedge against other assets during a crisis. However, gold's role as a safe haven asset is only partially valid, depending on the region or specific stock price index ([Ghorbali & Naoui, 2022](#)). This means that while gold may have a significant influence on other assets during a crisis, it may not have the same influence on the IHSG.

Mahendra (2022) also emphasized that gold has a positive impact on the Indonesian Composite Index (IHSG) in both the short and long term. Gold has a positive and significant impact, as

researched by [Rahim \(2021\)](#), although the IDR exchange rate has a negative and significant impact on the IHSG. The pandemic, which struck in the first quarter of 2020, delivered a severe blow to the IHSG. Many investors succumbed to panic selling, offloading some stocks due to fears of a drastic market decline, leading to a staggering 30% drop in the Indonesian stock price index in the first quarter of 2020. The demand for stocks plummeted, hence the unsurprising fall in stock prices. Investors tend to reduce their exposure to risky assets (such as stocks) and increase their holdings in more stable assets, such as gold, when the stock market experiences pressure due to factors such as economic crises, rising global interest rates, or the pandemic. This behavior led to an outflow from the stock market and an inflow into the gold market, resulting in an increase in gold prices and a decline in the IHSG. However, when the market is stable or optimistic, investors become more confident in risky assets, diminishing gold's role as a safe haven. As a result, the relationship between gold prices and the Indonesian Composite Index (IHSG) becomes insignificant or even insignificant in some situations.

The Effect of Crude Oil Prices on the IHSG. Based on quantile regression and GLM tests, crude oil has a significance level of $P < 0.00$, indicating an absolute probability that crude oil prices affect the IHSG. Over the entire period of the quantile regression and GLM tests, oil has a sufficiently large coefficient, indicating that oil has a very positive and significant effect on the IHSG. This is emphasized [Rahayu and Diatmika \(2023\)](#), who found that crude oil prices have a positive effect on the IHSG. Similarly, research by [Ikhsani et al. \(2023\)](#) also found that crude oil has a positive effect on the IHSG. Although this study shows that oil prices positively influence the IHSG at the upper quantile, it should be noted that this relationship may differ in weak market conditions or at the lower quantile, which is not addressed in this study. This is in line with research using quantile regression analysis and GLM, which found that oil had a high and significant coefficient for each period (before, during, and after the pandemic). Many industrial sectors heavily rely on crude oil as their primary energy source for production. Oil prices are a pivotal variable influencing the stock market. In general, high oil prices inflate companies' operating costs, including production costs, particularly in the transportation, manufacturing, and energy sectors, which ultimately negatively impact company profits and their stocks. However, it is important to note that extreme oil price increases can also trigger inflation and reduce purchasing power, ultimately lowering the Indonesian Composite Index (IHSG).

On the other hand, lower oil prices also provide room for growth in domestic industrial sectors. Priyana and Rosaria (2024) stated that the decline in oil prices at the start of the pandemic indicated weakening global demand and economic uncertainty, leading to a decline in the IHSG. On the other hand, the easing of lockdown restrictions was indicated as an early sign of economic recovery, which in turn strengthened the IHSG. This relaxation, coupled with the massive vaccination drive, provides a strong signal for the IHSG's recovery, as it will stimulate economic activity to return to normal.

The Impact of COVID-19 on the Indonesian Composite Index. Based on quantile regression and GLM tests conducted over the entire period, COVID-19 had a negative impact with a probability of $P < 0.00$. However, COVID-19 has a very small negative coefficient on the IHSG; thus, it can be concluded that COVID-19 had no impact on the IHSG. When it was first announced as a pandemic, COVID-19 caused investors to respond with panic and high uncertainty. This was evident in the local stock index (IHSG), which dropped by up to 30% within two months, around May 2020. This decline was one of the worst price declines ever experienced on the Indonesian stock market. Therefore, the IDX implemented trading halts or

temporary suspensions of the stock market several times to stabilize the stock market. Uncertainty is a key factor in explaining the stock market. Under these conditions, investors turned to other, safer assets such as gold or government bonds, so it is not surprising that the IHSG experienced a decline in demand. Many companies, particularly those in the tourism, transportation, hospitality, retail, and manufacturing sectors, experienced drastic declines. This ultimately negatively impacted their stock prices. With the government's intensive vaccination drive at the end of 2020 and the easing of social restrictions, the economy returned to normal. The Indonesian Composite Index (IHSG) expressed positive optimism about this economic recovery. However, this recovery was not linear. The emergence of other COVID-19 variants, such as Omicron and Delta, raised market concerns about uncertain fluctuations. However, the market generally demonstrated greater resilience than before due to adaptation to previous risks. [Rahayu and Diatmika \(2023\)](#) stated that global economic uncertainty caused by the pandemic, along with fluctuations in global oil prices, significantly impacted the IHSG. They also found that the recovery in oil prices and the effectiveness of vaccinations would have a positive impact on the IHSG. It can be seen that after the declaration that COVID-19 was no longer a pandemic, the IHSG demonstrated optimism with a reasonably convincing price increase. This demonstrates the IHSG's resilience amidst uncertain economic conditions, even though the IHSG initially exhibited panic and plummeted. However, thanks to its rapid adaptation to government policies, the IHSG was able to adjust to its conditions. This study shows that daily COVID-19 cases have no significant effect on the IHSG. The primary influences influencing the IHSG decline are fundamental economic factors and government policies to prevent the spread of COVID-19, such as the implementation of lockdowns. The rise in COVID-19 cases does not necessarily have a direct impact on the economy. Combined with government stimulus measures to revive the post-pandemic economy, the IHSG has been able to withstand the economic uncertainty. This demonstrates that the government has implemented effective policy responses, enabling the market to adapt to the prevailing conditions.

5. Conclusion

It can be concluded that (1) the 75% quantile regression analysis found that all three dependent variables had a positive effect on the dependent variable. World gold and crude oil prices had a positive effect on the Indonesian Composite Index (IHSG), with positive coefficients. However, the coefficient for gold was less than 1, indicating that gold had a minimal impact on the IHSG. In contrast, oil had a larger coefficient than gold, indicating that oil could be classified as a highly influential variable on the IHSG. COVID-19 had a significant probability effect but with a negative coefficient. Although the coefficient was negative, COVID-19 had a very small coefficient, indicating that COVID-19 did not affect the IHSG; (2) the results of the Generalized Linear Model (GLM) data processing showed the same effect for all three independent variables on the dependent variable. In terms of probability, the prices of gold, crude oil, and COVID-19 all had absolute probabilities. The gold price had a positive coefficient effect. However, due to the small coefficient, it could be concluded that gold did not affect the IHSG. Oil also has a positive coefficient, but with a coefficient value significantly higher than gold, thus having a significant positive effect on the Indonesian Composite Index (IHSG). COVID-19 has a perfect probability of occurrence but with a negative coefficient. Although the coefficient is negative, COVID-19 has a very small coefficient value, so the number of daily COVID-19 cases does not affect the IHSG price.

In this study, it is important to remember that one of the dependent variables, gold, has safe haven asset properties, meaning it serves as a hedge against other assets, specifically not the IHSG or the stock market. Therefore, it is natural that gold has little impact on the IHSG. This is somewhat different from oil, which has a significant effect on the IHSG. Rising oil prices can occur as a sign of post-crisis economic recoveries, such as increased energy demand, increased industrial and transportation activity, and even a signal that the global economy is growing. This also affects the IHSG because companies engaged in the energy sector are listed on the IHSG more heavily than gold mining companies. When oil prices rise, oil and gas companies will experience larger profit margins due to increased demand. This increase in oil prices will also drive up the share prices of these oil and gas issuers. COVID-19 was initially thought to be the factor causing the IHSG (Indonesian Stock Exchange Composite Index) to decline. However, this appears not to be the case. Based on research, daily COVID-19 cases actually show no impact on the IHSG. It is undeniable that the IHSG declined at the beginning of the pandemic. However, this was not due to daily COVID-19 cases, but rather to adjustments to Indonesia's fiscal and monetary policies, social restrictions, commodity prices, and global geopolitical conditions, including the ongoing COVID-19 pandemic, which influenced these policies. During the lockdown, economic activity in Indonesia was automatically hampered, resulting in a very limited economic impact on the IHSG. Furthermore, the rise in COVID-19 cases was also considered a health risk, not an economic one. Daily COVID-19 cases no longer impacted the market because the stock market had adjusted to the pandemic risk, which was considered manageable, allowing investors to focus more on other, more relevant macroeconomic issues.

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