



The Impact of Coal, Nickel, and Crude Oil Prices on the Composite Stock Price Index 2020-2023

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Abstract Several elements can impact stock prices on the Indonesia Stock Exchange (IDX). A key factor is the variation in prices of coal, nickel, and crude oil, which is significant due to the considerable market capitalization of this sector in Indonesia. This study aims to assess the influence of coal, nickel, and crude oil prices on the Jakarta Composite Index (JCI). The research utilizes quantitative data, specifically secondary data sources. The data analysis covers a monthly period from 2020 to 2023, with multiple regression analysis employed as the technique. The study's outcomes indicate a notable effect of nickel and crude oil prices on the JCI from 2020 to 2023.

Keywords: Crude Oil Price, Nickel Price, Coal Price, IHSG, Multiple Linear Regression

Introduction

The variations in stock prices play a critical role in shaping investors' willingness to invest their capital (Nadeem et al., 2020). Macroeconomic factors, including economic growth, inflation, and interest rates, significantly influence stock price trends. When economic growth is on the rise, companies typically exhibit strong performance and gain credibility, which positively affects stock prices. However, inflation can lead to higher interest rates. In 2020, Indonesia's inflation rate was below the government's target range of 2% to 4%. This low inflation level corresponds with a reduction in demand and purchasing power, largely driven by the pandemic's impact (Rahmayani et al., 2021).

The Jakarta Composite Index, commonly referred to as IHSG, JCI, or JSX Composite, is calculated based on the prices of all stocks listed on the Indonesia Stock Exchange (IDX), with a predominant focus on the market capitalization of each stock. The IHSG serves as an indicator of the overall movement of stock prices on the IDX, which includes both common and preferred stocks (Samsuar & Sihombing, 2020). It is essential to understand that an increase in the IHSG does not imply that all stocks on the IDX will experience a rise in value. This is attributed to the weighted average nature of the IHSG, where larger market capitalization stocks have a more pronounced effect than those with smaller capitalizations.

(Kartikasari, 2016). Numerous factors can influence the stock price index, such as changes in central bank interest rates, global economic trends, world energy prices, and the political climate of a country (Blanchard & Sheen, 2013). Moreover, the behavior of investors significantly impacts the fluctuations of the stock price index. The significance of world energy prices in the Indonesian economy is notable, as mining companies listed on the IHSG represent about 13.9% of its total capitalization. Additionally, the mining sector accounts for approximately 39.7% of stock.

The study conducted by (Prastyo & Setiartiti, 2018) reveals that global coal prices have a beneficial (+) impact on the mining index in both short and long-term scenarios. In contrast, world gold prices are shown to have a detrimental (-) effect on the mining index across both time frames. Oil prices positively influence the mining index, although this effect is not sustained in the long term. Additionally, world nickel prices negatively impact the mining index in both the short and long term. Research by (Kilian & Park, 2009) suggests that if rising global oil prices are a result of increased demand stemming from uncertainties about future oil supply, this can negatively affect the capital market. Conversely, if the rise is due to an expanding global economy, it can have a positive effect on the capital market. Moreover, (Yulistiyo & Indrawati, 2023) found that world nickel prices do not significantly influence stock prices. The inconsistencies in prior studies led the author to initiate a research project titled "The Impact of Coal, Nickel & Petroleum Prices on the Composite Stock Price Index 2020-2023."

Methods

This study is identified as explanatory research utilizing a quantitative framework. It is conducted at the Indonesia Stock Exchange, specifically examining mining companies within the metal and other mineral sub-sectors. The aim of this research is to investigate the relationship between coal, nickel, and petroleum prices and their effect on the Jakarta Composite Index (JCI). The research relies on secondary data, which comprises monthly time series data on global gold prices, global oil prices, and the JCI, covering the timeframe from January 2020 to December 2023. The analysis is performed using multiple linear regression techniques.

Results and Discussion

Normality Test

According to the results of the One-Sample Shapiro-Wilk test, the significance value (Asymp. Sig.) is 0.953, which is greater than 0.947. This leads to the conclusion that the residual values follow a normal distribution, thereby meeting the assumption of normality.

Multicollinearity Test

Data is regarded as free from multicollinearity when the tolerance value is greater than 0.10 and the Variance Inflation Factor (VIF) is less than 10. According to Table 1, the regression model shows no evidence of multicollinearity.

Table 1. Value of tolerance & VIF

Variable	Tolerance	VIF
Coal	0,36814	2,716361
Nickel	0,376394	2,656791
Crude Oil	0,311486	3,210412

Heteroscedasticity

Test

The assessment of heteroscedasticity was carried out through the Glejser Test. Following the criteria set forth by (Ghozali, 2016), a t-test significant value greater than 0.05 suggests that there are no signs of heteroscedasticity present.

Table 2. Value of sig. Glejser Test

Variable	Sig.
Coal	0,300
Nickel	0,183
Crude Oil	0,353

Autocorrelation Test

The results obtained from the autocorrelation test indicate that the Durbin Watson (dW) statistic is 0.507. When consulting the Durbin Watson statistical table at a significance level of 0.05, with a sample size of 48 and three independent variables ($k = 3$), the critical values are found to be $dL = 1.4064$ and $dU = 1.6708$. This leads to the conclusion that DW is less than dL and greater than dU.

Multiple Linear Analysis Test

Table 3. Multiple Linear Analysis Test Results

Model	Unstandardized Coefficient	
	B	Std. Error
1 (Constant)	3836,269	199,5581
Coal (X1)	-0,553	0,682
Nickel (X2)	0,462	0,195
Crude Oil (X3)	26,562	4,031

In analyzing the equation derived from the multiple linear analysis test results, several important findings emerge. The Coal variable (X1) is associated with a negative coefficient of -0.553, indicating that a 1% rise in Coal leads to a decrease of 0.55301 in the IHSG Price (Y), assuming that other independent variables are constant. Conversely, the Nickel variable (X2) has a positive coefficient of 0.462, which implies that a 1% increase in Nickel results in an increase of 0.462 in the IHSG Price, provided that other independent variables do

not change. Furthermore, the Crude Oil variable (X3) has a notably high positive coefficient of 26.562, suggesting that a 1% increase in Crude Oil results in an increase of 26.562 in the IHSG Price (Y), with other independent variables remaining constant.

Model Feasibility Test (F Test)

According to Table 4, the significance value of 0.000 falls below the α value of 0.05. This result demonstrates that the regression model is deemed suitable for implementation.

Table 4. Result of F Test

	<i>Df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	3	24502153	8167384	81,92093	0,000
Residual	44	4386729	99698,39		
Total	47	28888882			

Coefficient of Determination (R²)

According to Table 5, the Adjusted R² value is recorded at 0.838, which translates to 83.8%. This finding reveals that 83.8% of the changes in Stock Price (Y) can be explained by the variables Coal (X1), Nickel (X2), and Crude Oil Price (X4). The remaining 16.2% of the variation is likely influenced by external variables that are not part of this model or have not been examined in this research.

Table 5. Result of coefficient determination

Model	R	R Square	Adjusted Square	R
1	0,921	0,848	0,838	

Partial Test

The results obtained from the t-test provide the following insights: For the first hypothesis test, the comparison of Coal Sensitivity (X1) with Stock Price (Y) yields a significance value of -0.809, which is lower than the t table threshold of 2.015. As a result, the alternative hypothesis (H_a) is rejected, leading to the conclusion that Coal Sensitivity (X1) does not exert a significant effect on the IHSG Price (Y). In the second hypothesis test, the t-test results for Nickel Sensitivity (X2) against Stock Price (Y) indicate a significance value of 2.365, surpassing the t table value of 2.015. Hence, the null hypothesis (H₀) is accepted, suggesting that Nickel Sensitivity (X2) does not significantly influence the IHSG Price (Y). Finally, in the third hypothesis test, the t-test results for Crude Oil Sensitivity (X3) and IHSG Price (Y) present a significance value of 6.588, which exceeds the t table value of 2.015. Therefore, the null hypothesis (H₀) is accepted, confirming that Crude Oil Sensitivity (X3).

Table 6. Result of partial test

Model	t stat	Remarks
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1 (Constant)	19,223	
Coal	-0,809	Insignificant
Nickel	2,365	Significant
Crude Oil	6,588	Significant

The Influence of Coal Price Sensitivity on IHSG Prices

The results obtained from the hypothesis test suggest that the greater sensitivity of Coal will impact the IHSG stock price over the years 2020 to 2023. This study indicates that the price of Coal has a negative and insignificant effect on the IHSG price, which stands in opposition to existing theoretical frameworks.

The Influence of Nickel Price Sensitivity on IHSG Prices

The analysis reveals that, within this timeframe, nickel prices have a significant and positive impact on the stock index in the short run. This indicates that variations in nickel prices can lead to alterations in the stock index; notably, an increase in nickel prices is likely to result in a corresponding rise in the stock index. Such a correlation suggests that rising nickel prices boost business activities, which in turn enhances profitability for companies engaged in nickel ore production and those associated with the industry, ultimately leading to an increase in the Jakarta Composite Index (JCI). Additionally, the export ban policy implemented by Indonesia has not significantly influenced the JCI, as evidenced by the period following the policy's introduction. This lack of impact can be explained by the fact that the overall behavior of nickel prices is contingent upon economic characteristics and the timing of their influence on the stock index, particularly the JCI.

The Influence of Crude Oil Price Sensitivity on IHSG Prices

According to the outcomes of statistical hypothesis testing, it is evident that the sensitivity of crude oil prices and the rupiah exchange rate significantly affects the composite stock price index (IHSG) in both the short and long term. An increase in global oil prices can lead to economic repercussions such as inflation, fluctuations in the rupiah exchange rate, and the potential for a current account deficit. The volatility in world crude oil prices has been exacerbated by the geopolitical conflict between Russia and Ukraine that began in 2022, which has contributed to prices rising above US\$100 per barrel since 2014.

Conclusion

The analysis and discussion surrounding the effects of coal, nickel, and crude oil prices on the Jakarta Composite Index (JCI) yield the following conclusions:

- 1) Coal prices have a negative and statistically insignificant effect on the JCI,
- 2) Nickel prices positively and significantly influence the JCI, and
- 3) Crude oil prices also have a positive and significant impact on the JCI.

Collectively, the influence of these commodities accounts for 84.8% of the changes observed in the JCI, with the remaining 15.2% being influenced by other variables not included in this study. It is recommended that future researchers consider this work as a foundational reference and explore additional factors such as inflation, gold prices, and economic growth that could affect the Jakarta Composite Index.

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