MUSYTARI
ISSN : 3025-9495
Neraca Akuntansi Manajemen, Ekonomi
Vol 25 No 9 Tahun 2026

THE IMPACT OF GEOPOLITICAL RISK, EXCHANGE RATE, AND PROFITABILITY ON THE STOCK RETURNS OF COAL SUB SECTOR COMPANIES LISTED ON THE IDX

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Abstract

This study aims to examine the impacts of geopolitical risk, exchange rate and profitability (Return on Asset) on the stock returns of coal subsector companies listed on the Indonesia Stock Exchange during the 2021-2025 period. The study adopts a quantitative causal research design using quarterly panel data collected from 35 coal subsector companies throughout the observation period. The data were analyzed using Panel Data Regression with the Common Effect Model (CEM). The simultaneous test results indicate that geopolitical risk, exchange rate, and profitability jointly have a significant impact on the stock returns of coal subsector companies. Partially, geopolitical risk has a negative and significant impact, indicating that heightened geopolitical uncertainty reduces investor confidence and consequently lowers stock returns. In contrast, the Rupiah exchange rate represented by JISDOR does not have a statistically significant impact on stock returns, suggesting that the positive impact of Rupiah depreciation on export revenues is offset by increasing economic uncertainty and higher corporate operating costs. Meanwhile, profitability, proxied by the lagged Return on Assets (ROA), has a positive and significant impact on stock returns, indicating that companies with stronger financial performance tend to generate higher returns for investors. The explanatory power of the research model in explaining variations in the stock returns of coal subsector companies is reflected by an Adjusted R^2 of 3.8%, while the remaining variation is explained by other factors outside the scope of this study.

Keywords: Geopolitical Risk, Exchange Rate, Return On Assets, Stock Returns, Coal Subsector.

Article history
Received: September 2026
Reviewed: September 2026
Published: September 2026

Plagirism checker no 80
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Publish by : musytari

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1. Introduction

The capital market plays an important role in the economy as a mechanism for mobilizing long-term funds and allocating capital to productive sectors. In Indonesia, this function is facilitated through the Indonesia Stock Exchange (IDX) as the organized institution for securities trading. For investors, the capital market serves not only as an investment platform but also as a source of information regarding a company's condition and future prospects. One of the important indicators in investment decisions is stock return, which reflects the return received by investors as well as market perceptions of a company's future performance.

One subsector that has an important position in the Indonesian capital market is coal mining. This position is closely related to Indonesia's role as one of the major coal producing and exporting countries in the global market. According to the U.S. Energy Information Administration (2025), Indonesia exported approximately 615 million short tons of coal in 2024, making it the world's largest coal exporter, with a share of approximately 38.8% of global seaborne coal trade. Indonesia's coal production in the same year reached approximately 836

million tons, exceeding the national production target of 710 million tons, or approximately 117% of the target. The mineral and coal sector also contributes substantially to the domestic economy. In 2023, the sector contributed approximately IDR 2,198 trillion, equivalent to 10.5% of Indonesia's Gross Domestic Product (GDP), and generated Non-Tax State Revenue (PNBP) of approximately IDR 173.0 trillion. These conditions demonstrate the strategic position of the coal industry and make coal companies listed on the IDX relevant for investment related research.

Nevertheless, the significant contribution of the coal sector does not necessarily imply stable stock performance. In 2024, the value of Indonesia's coal exports decreased by approximately 11.9% despite an increase in export volume. The decline was mainly associated with weakening global coal prices. This phenomenon illustrates the high sensitivity of the coal industry to developments in international commodity markets. As an important energy commodity, coal prices are influenced by various external factors, meaning that changes in global prices can directly affect company revenues, profitability, and ultimately stock performance.

Global coal prices experienced substantial fluctuations during the 2021–2025 period. The Newcastle Coal Futures (NEWC), which is commonly used as a benchmark for thermal coal prices in the Asia-Pacific region, recorded considerable changes throughout the period. Based on Investing.com (2026), the average coal price increased from USD 150.45 per ton in 2021 to USD 356.96 per ton in 2022, representing the highest level during the observation period. The sharp increase was associated with the post-pandemic economic recovery and, particularly, Russia's invasion of Ukraine, which contributed to disruptions in global energy supplies. Following the peak in 2022, the average price declined to USD 183.10 per ton in 2023, USD 133.45 per ton in 2024, and further to USD 107.24 per ton in 2025. The subsequent decline reflected the normalization of market conditions, increasing renewable energy capacity, and easing geopolitical pressures. These developments indicate that the coal industry operates within a highly dynamic global market environment.

Changes in global coal prices were also accompanied by considerable fluctuations in the stock returns of coal subsector companies listed on the IDX. The sharp increase in coal prices in 2022 provided favorable conditions for coal companies and contributed to improvements in their performance. However, this favorable situation was not sustained. Between 2023 and 2025, the normalization and decline in coal prices, combined with weakening global demand, created greater pressure on company performance. Indonesia's coal exports also declined by approximately 12% year-on-year during the beginning of 2025. Reuters reported that coal shipments reached approximately 150 million tons during January–April 2025, reflecting weaker demand from major importing countries such as China and India. This situation suggests that stock returns in the coal subsector are influenced not only by internal company fundamentals but also by changes in external economic and global market conditions.

One external factor that may influence stock returns is geopolitical risk. Caldara and Iacoviello (2022) define geopolitical risk as the threat, realization, or escalation of events related to war, terrorism, and tensions between countries that disrupt peaceful international relations. This risk is measured using the Geopolitical Risk Index (GPR), which was developed through the analysis of international newspaper coverage. An increase in geopolitical risk can create greater uncertainty in economic and investment activities, influence asset prices, and increase investors' perceptions of market risk. The 2021–2025 period provides a relevant context for examining this relationship because it was characterized by several major geopolitical events, including Russia's invasion of Ukraine in 2022, the Hamas attack on Israel in 2023 that contributed to heightened tensions in the Middle East, and the escalation of the Israel–Iran conflict in 2025.

For Indonesia as a commodity exporting country, geopolitical risk may generate both positive and negative consequences. On the one hand, geopolitical conflicts that disrupt global energy supplies may increase demand for coal and potentially benefit Indonesian coal exporters.

On the other hand, prolonged geopolitical uncertainty may encourage investors to reduce exposure to risky assets in emerging markets, potentially causing capital outflows and putting pressure on stock market performance. Therefore, the relationship between geopolitical risk and stock returns in the coal subsector cannot be assumed to follow a single direction and requires further empirical examination.

In addition to geopolitical risk, the exchange rate of the Indonesian rupiah against the United States dollar is another important external factor for coal companies. Coal is traded internationally in U.S. dollars, meaning that exchange rate movements can affect company revenues when foreign currency earnings are converted into rupiah. During 2021–2025, the rupiah generally experienced depreciation against the U.S. dollar, moving from approximately IDR 14,263 per USD at the end of 2021 to IDR 15,592 in 2022, IDR 15,399 in 2023, IDR 16,027 in 2024, and approximately IDR 16,900–17,000 in 2025. This study measures the exchange rate using the Jakarta Interbank Spot Dollar Rate (JISDOR), which is published by Bank Indonesia and represents a reference exchange rate based on foreign exchange transactions in the domestic interbank market. A weaker rupiah may increase export revenues when expressed in local currency. However, depreciation may also signal macroeconomic uncertainty and affect investor confidence. Consequently, the impact of exchange rate movements on stock returns remains an empirical question.

Apart from external factors, internal company performance, particularly profitability, may also influence stock returns. In this study, profitability is measured using Return on Assets (ROA), which indicates a company's ability to generate net income through the utilization of its total assets. From the perspective of Signaling Theory, a higher ROA may provide a positive signal to investors regarding management effectiveness and the company's future prospects. However, the profitability of coal companies tends to be cyclical because it is strongly affected by changes in global coal prices. When coal prices increase, company revenues and profits may improve, resulting in higher ROA. Conversely, declining coal prices can reduce profitability and place pressure on ROA. This characteristic suggests that the relationship between profitability and stock returns may vary according to market conditions.

Although previous studies have examined various determinants of stock returns in the mining sector, several research gaps remain. First, geopolitical risk has not been widely incorporated as a major explanatory variable in studies of stock returns, despite its potential influence on both commodity and financial markets. Second, research involving geopolitical risk has generally examined broader market indices rather than focusing specifically on the coal subsector. Third, previous studies have not fully captured the distinctive market conditions during 2021–2025, a period characterized by post-pandemic recovery, a commodity price boom, price normalization, and subsequent market pressure. Fourth, previous empirical findings concerning the impacts of exchange rates and profitability on stock returns remain inconsistent. These gaps indicate the need for further research that examines external and internal factors simultaneously within the specific context of coal subsector companies.

Based on these phenomena and research gaps, examining the determinants of stock returns in coal subsector companies is considered important and relevant. Therefore, this study aims to analyze the impact of geopolitical risk, exchange rates, and profitability, as measured by ROA, on the stock returns of coal subsector companies listed on the Indonesia Stock Exchange during the 2021–2025 period, both partially and simultaneously. The study is expected to contribute to the literature concerning the determinants of stock returns, particularly by incorporating geopolitical risk into the analysis of the coal subsector. In addition, the findings are expected to provide useful information for investors, corporate management, and policymakers in responding to increasingly complex economic, commodity, and geopolitical dynamics.

2. **Theoretical Studies**

Arbitrage Pricing Theory (APT)

Arbitrage Pricing Theory (APT), introduced by Ross (1976), explains that the return of a financial asset is influenced by its exposure to multiple systematic risk factors rather than by a single source of risk. The theory assumes that, under equilibrium conditions, asset returns can be represented through a linear relationship between expected returns and several common factors that affect asset prices. This multifactor perspective makes APT relevant for analyzing companies whose performance is strongly influenced by changes in macroeconomic and global conditions. Recent asset-pricing research continues to support the relevance of multifactor structures in explaining variations in equity returns (e.g., Gagliardini et al., 2021). In the context of this study, geopolitical risk and the exchange rate represent systematic factors that may influence the stock returns of coal subsector companies because the industry is closely connected to global energy markets, international trade, and foreign exchange movements. Geopolitical tensions may affect energy supply, coal demand, and commodity prices, while exchange rate fluctuations may influence the rupiah value of export revenues denominated in U.S. dollars. Therefore, APT provides an appropriate theoretical foundation for examining the simultaneous influence of geopolitical risk, exchange rates, and other systematic factors on the stock returns of coal subsector companies listed on the Indonesia Stock Exchange.

Real Option Theory

Real Option Theory, developed by Myers (1977), views firm value as consisting not only of the value of assets currently in place but also of the value of future investment opportunities that management can exercise depending on changing market conditions. The theory emphasizes that when investment decisions involve uncertainty, irreversibility, and managerial flexibility, uncertainty does not necessarily reduce firm value because the ability to delay, expand, reduce, redirect, or abandon an investment can itself have economic value. Recent research continues to demonstrate that uncertainty and financial flexibility affect firms' investment decisions and the value of growth opportunities, supporting the relevance of the real-options perspective in uncertain environments (e.g., Li et al., 2021). In the context of coal companies, geopolitical uncertainty can simultaneously increase operational risks and the value of managerial flexibility because firms may adjust production, export destinations, capital expenditure, or operating capacity in response to changing global conditions. Similarly, exchange rate movements can affect the value of export revenues and influence production and marketing decisions, while profitability reflected by ROA represents the firm's ability to generate returns from existing assets and provides financial capacity to pursue future investment opportunities. Thus, Real Option Theory helps explain why the impacts of geopolitical risk, exchange rates, and profitability on stock returns may vary according to market conditions and the ability of firms to respond flexibly to uncertainty.

Signalling Theory

Signalling Theory, initially introduced by Spence (1973), explains how information asymmetry encourages parties with superior information to communicate signals that enable less informed parties to assess underlying quality or performance. In the capital market, corporate financial information can function as a signal because management generally possesses more detailed information about the company than external investors. Recent corporate-finance literature continues to recognize disclosure and financial information as important mechanisms for reducing information asymmetry and influencing investors' assessments of firm quality. In this study, profitability is represented by Return on Assets (ROA), which indicates the effectiveness of management in utilizing the company's total assets to generate net income. A relatively high ROA may provide a positive signal concerning operational efficiency and future prospects, potentially increasing investor confidence and demand for the company's shares, whereas declining ROA may be interpreted as a negative signal regarding

financial performance and future prospects. This relationship is particularly relevant for coal companies because their profitability tends to fluctuate with global coal prices; therefore, changes in ROA can provide investors with information about the company's ability to manage its assets and maintain performance under changing commodity market conditions.

Geopolitical Risk Index

Geopolitical risk refers to uncertainty arising from threats, occurrences, or escalation of events involving international conflict, war, terrorism, and tensions between countries that may disrupt economic and international relations. In this study, geopolitical risk is measured using the Geopolitical Risk Index (GPR) developed by Caldara and Iacoviello, which quantifies geopolitical tensions through the frequency of newspaper articles discussing adverse geopolitical events and related threats. Caldara and Iacoviello's measurement framework is particularly relevant because geopolitical risk can affect investors' risk perceptions, international capital movements, commodity markets, and global supply chains. For coal companies, changes in geopolitical risk may influence energy security, international trade routes, coal demand, and commodity prices. An increase in GPR may therefore create both downside risks through greater uncertainty and potential opportunities when geopolitical disruptions increase demand for alternative energy supplies. In this study, a higher GPR value indicates a higher level of global geopolitical risk, while a lower value reflects relatively more stable geopolitical conditions.

Exchange Rate

The exchange rate represents the relative value of one currency against another and, in this study, refers specifically to the Indonesian rupiah against the U.S. dollar (IDR/USD). An increase in the IDR/USD rate indicates a depreciation of the rupiah because more rupiah are required to obtain one U.S. dollar, whereas a decline indicates rupiah appreciation. For Indonesian coal companies engaged in international trade, exchange rate movements are particularly relevant because coal export transactions are generally denominated in U.S. dollars, meaning that changes in the exchange rate can affect the rupiah value of export revenues and the company's financial performance. The exchange rate in this study is measured using the Jakarta Interbank Spot Dollar Rate (JISDOR), which is published by Bank Indonesia as a representative reference rate for USD/IDR spot transactions based on actual interbank foreign exchange transactions. A rupiah depreciation may increase the rupiah value of dollar denominated export revenues, potentially benefiting exporters; however, exchange rate movements may also increase the burden of foreign currency liabilities, imported equipment costs, and perceptions of macroeconomic instability.

Profitability

Profitability reflects a company's ability to generate profit through the resources and assets under its management and is commonly used to assess corporate financial performance and managerial effectiveness. In this study, profitability is measured using Return on Assets (ROA), which indicates the ability of a company to generate net income from its total assets. ROA is particularly relevant because it provides an overall assessment of how efficiently management utilizes the company's asset base to generate earnings. From the perspective of Signalling Theory, profitability information can provide investors with an indication of the company's current performance and future prospects, thereby influencing investment decisions and stock valuation. For coal companies, however, profitability is strongly influenced by fluctuations in global coal prices, making ROA relatively cyclical. During periods of high coal prices, stronger revenues and earnings may increase ROA, whereas declining commodity prices can reduce profitability and weaken ROA. In this study, the profitability variable is represented by one-quarter lagged ROA (L.ROA), reflecting the assumption that investors respond to

profitability information after it becomes publicly available through financial reporting. Thus, previous period profitability is expected to provide information that may influence investors' decisions and subsequent stock returns.

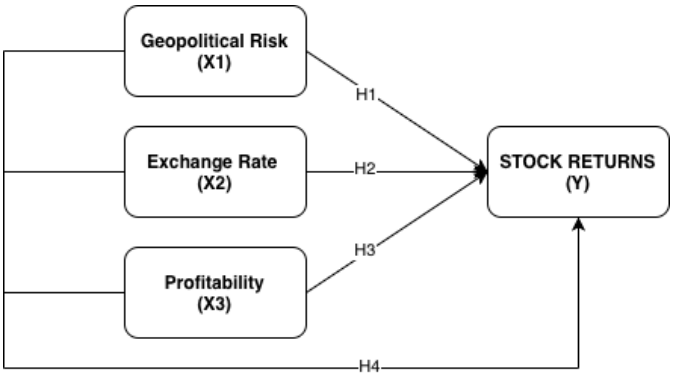
Stock Returns

Stock return represents the gain or loss obtained by investors from holding shares during a particular period and is generally reflected through changes in stock prices and, where applicable, dividend income. In empirical capital market research, stock return is commonly used as an indicator of investment performance because it captures changes in the economic value received by shareholders over time. In this study, stock returns are measured using a price based return, calculated from the change in the closing stock price between the current period and the preceding period. This approach focuses on changes in market prices and provides a consistent measure for comparing the performance of coal subsector companies across the observation period. Stock returns are particularly relevant to this research because coal companies experienced substantial changes in market conditions during 2021–2025, including the post pandemic recovery, the sharp increase in global coal prices in 2022, subsequent price normalization, and weakening commodity demand. These developments may cause investors to reassess the risks and prospects of coal companies, resulting in fluctuations in their stock prices and returns

Conceptual Framework and Hypotheses

The variables examined in this study consist of three independent variables, namely Geopolitical Risk, Exchange Rate, and Profitability, and one dependent variable, namely Stock Returns. These variables are examined to determine the direct relationships among them in the context of Coal Sub Sector companies that listed on the Indonesia Stock Exchange (IDX).

Figure 1. Conceptual Framework



Source : Data Processed (2026)

Based on the conceptual framework presented in Figure 1, the relationships among these variables are formulated into four hypotheses, as follows:

H1 : Geopolitical risk has a negative and significant impact on stock returns
H2 : Exchange rate has a positive and significant impact on stock returns
H3 : Profitability (ROA) has a positive and significant impact on stock returns
H4 : Geopolitical risk, Exchange rate and Profitability (ROA) have a significant impact on stock returns

3. Research Methods

Research Approach

This study employs a quantitative explanatory approach to examine the impact of geopolitical risk, the rupiah exchange rate, and profitability on the stock returns of coal subsector companies listed on the Indonesia Stock Exchange (IDX). The study uses panel data analysis, which combines cross-sectional data from companies and time-series data covering the 2021–2025 period. This approach enables the analysis to capture differences among companies as well as changes over time and is consistent with the Arbitrage Pricing Theory (APT), which explains stock returns through multiple systematic risk factors.

Population, Sample Size and Sampling Technique

The population consists of all coal subsector companies listed on the IDX during 2021–2025. The sample is selected using purposive sampling based on predetermined criteria, namely companies that were consistently listed during the observation period, regularly published financial statements, and were not suspended or delisted during 2021–2025. Based on these criteria, 35 companies were selected as the research sample, with the resulting firm-year observations forming the panel dataset.

Data Type, Sources and Collection Method

This study uses secondary data collected through documentation from credible and publicly available sources. Financial statement data are obtained from the official IDX website and the respective company websites, stock price data are obtained from Yahoo Finance, geopolitical risk data are sourced from the Geopolitical Risk Index developed by Caldara and Iacoviello, and exchange rate data are obtained from Bank Indonesia. The collected data are systematically compiled and verified for completeness and consistency before being analyzed using panel data techniques.

Operational Definition of Research

Table 1. Operational Definition of Variables

No.	Variable	Operational Definition
1.	Stock Return (Y)	Stock return is defined as the gain or loss obtained by investors from their investment in a particular stock over a certain period. It reflects the performance of a company in generating value for its share. In this study, stock return is measured using the percentage change in stock prices between two consecutive periods. This measurement is widely used in financial research as it captures the actual return received by investors $$\boldsymbol{R = \frac{(P_t - P_{t-1})}{P_{t-1}}}$$ Where : R = stock return of company *i* at time *t* P_t = stock price at time *t* P_{t-1} = stock price at time *t-1*
2.	Geopolitical Risk (X_1)	Geopolitical risk refers to the risk arising from political tensions, conflicts, terrorism, and international instability that may affect economic conditions and financial markets. In this study, geopolitical risk is measured using the Geopolitical Risk (GPR)

		Index developed by Matteo Iacoviello and Dario Caldara obtained from the website matteoiacoviello.com.
3.	Exchange Rate (X_2)	The exchange rate represents the value of one currency in terms of another currency. In this study, the exchange rate is measured using the USD/IDR rate, which reflects the value of the Indonesian Rupiah against the United States Dollar. Exchange rate data are obtained from Bank Indonesia, specifically using the Jakarta Interbank Spot Dollar Rate (JISDOR). The following is the exchange rate of the Indonesian rupiah (IDR) to the U.S. dollar (USD) as of December 31, 2025: IDR 16,720 = USD 1.00
4.	Return On Aset (X_3)	Return on assets is a profitability ratio used to determine a company's rate of return on investment and its ability to generate net income from its assets, reflecting management efficiency in utilizing company resources. This ratio is calculated by dividing the company's net income by its total assets. The following is the formula for ROA: $$\boldsymbol{ROA = \frac{Net\ Income}{Total\ Asset} \times 100\%}$$

Data Analysis Technique

Descriptive Statistics

Descriptive statistics are used to provide an overview of the characteristics and distribution of the research variables. The analysis presents the mean, median, minimum, maximum, and standard deviation of geopolitical risk, exchange rate, profitability, and stock returns during the observation period.

Panel Data Regression Analysis

Panel data regression is used to examine the impact of geopolitical risk, exchange rate, and profitability on stock returns by combining cross-sectional and time-series data. This method enables the analysis to capture differences among companies and changes over time. The appropriate regression model is selected from the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) using the Chow, Hausman, and Lagrange Multiplier tests.

$$R_{i_t} = \alpha + \beta_1 GPR_t + \beta_2 ER_t + \beta_3 ROA_{t-1} + \varepsilon_{i_t}$$

Chow Test

The Chow test is used to determine whether the Common Effect Model (CEM) or Fixed Effect Model (FEM) is more appropriate for the panel data. A probability value below 0.05 indicates that the FEM is preferred, whereas a probability value above 0.05 indicates that the CEM is more appropriate.

Hausman Test

The Hausman test is used to determine whether the Fixed Effect Model (FEM) or Random Effect Model (REM) is more suitable. A probability value below 0.05 indicates that the FEM is selected, while a probability value above 0.05 indicates that the REM is preferred.

Lagrange Multiplier Test

The Lagrange Multiplier (LM) test is used to determine whether the Random Effect Model (REM) or Common Effect Model (CEM) is more appropriate. A probability value below 0.05 indicates that the REM is preferred, while a probability value above 0.05 indicates that the CEM is more appropriate.

Data Quality Test

Multicollinearity Test

The multicollinearity test is used to identify whether a strong linear relationship exists among the independent variables. This study uses the Variance Inflation Factor (VIF) and tolerance values as indicators. Multicollinearity is considered absent when the VIF is below 10 and the tolerance value is above 0.10.

Heteroscedasticity Test

The heteroscedasticity test examines whether the variance of the regression residuals is constant across observations. In this study, White's test is employed, where a probability value greater than 0.05 indicates the absence of heteroscedasticity, while a value below 0.05 indicates its presence.

Hypothesis Testing

T-Test

The t-test is used to examine the partial impact of each independent variable on stock returns. An independent variable is considered to have a significant partial impact when its probability value is below 0.05. Conversely, a probability value above 0.05 indicates that the variable does not have a statistically significant partial impact.

F-Test

The F-test is used to examine whether geopolitical risk, exchange rate, and profitability jointly have a significant impact on stock returns. A probability value below 0.05 indicates that the independent variables have a significant simultaneous impact, while a value above 0.05 indicates that their simultaneous impact is not statistically significant.

4. Results and Discussion

4.1 Result

Descriptive Statistics

Table 2. Results of Descriptive Statistical

Variable	Obs	Mean	Std. Dev.	Min	Max
gpr indonesia	700	6.244	3.613	.95	18.314
kurs	700	15348.75	802.323	14184	16668
roa lag	665	.028	.046	-.224	.242
return	700	.111	.433	-.602	4.375

Source: Data processed using Stata 17 (2026)

Based on Table 2, the descriptive statistics indicate that GPR Indonesia has a mean value of 6.244, with a standard deviation of 3.613 and a range of 0.95–18.314, indicating substantial variation in geopolitical risk during the observation period. The exchange rate has a mean of

IDR 15,348.75, a standard deviation of 802.323, and ranges from IDR 14,184 to IDR 16,668. Lagged ROA has a mean of 0.028, a standard deviation of 0.046, and ranges from -0.224 to 0.242, while stock returns have a mean of 0.111, a standard deviation of 0.433, and range from -0.602 to 4.375. The lagged ROA consists of 665 observations because the first-period observation for each company has no preceding ROA value.

Panel Data Regression Analysis

a) Chow Test

If the probability cross section value F > 0.05, then the common effects model is selected. Conversely, if the probability cross section value F < 0.05, then the fixed effects model is selected. The following are the results of the Chow test:

Table 3. Chow Test

return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
gpr_indonesia	-.017	.005	-3.56	0	-.027	-.008	***
kurs	0	0	1.47	.142	0	0	
L.roa	2.314	.535	4.33	0	1.264	3.364	***
Constant	-.37	.358	-1.03	.301	-1.072	.332	

Mean dependent var	0.117	SD dependent var	0.432
R-squared	0.040	Number of obs	665
F-test	8.672	Prob > F	0.000
Akaike crit. (AIC)	725.539	Bayesian crit. (BIC)	743.538

*** p<.01, ** p<.05, * p<.1

F test that all u_i=0: F(34, 627) = 0.79 Prob > F = 0.7967

Source: Data processed using Stata 17 (2026)

The Chow test produces an F-statistic of 0.79 with a probability value of 0.7967. Since the probability value is greater than 0.05, there is no significant individual effect among the sampled companies. Therefore, the Common Effect Model (CEM) is preferred to the Fixed Effect Model (FEM).

b) Hausman Test

If the probability value for the random cross section is < 0.05, then the fixed effects model is selected. However, if the probability value for the random cross section is > 0.05, then the random effects model is selected. The following are the results of the Hausman test:

Table 4. Hausman Test

	Coef.
Chi-square test value	3.424
P-value	.18

Source: Data processed using Stata 17 (2026)

The Hausman test produces a chi-square value of 3.424 with a probability value of 0.1805. Since the probability value exceeds 0.05, there is no significant correlation between individual effects and the independent variables. Therefore, the Random Effect Model (REM) is preferred to the Fixed Effect Model (FEM).

c) Lagrange Multiplier Test

If the cross sectional value is < 0.05, then the random effects model is selected. Conversely, the common effects model is selected if the cross-sectional value is > 0.05. The following are the results of the Lagrange Multplier test:

Table 5. Lagrange Multiplier'

return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
gpr_indonesia	-.016	.005	-3.31	.001	-.025	-.006	***
kurs	0	0	1.08	.28	0	0	
L.roa	1.602	.372	4.31	0	.874	2.331	***
Constant	-.207	.345	-0.60	.548	-.883	.469	

Mean dependent var	0.117	SD dependent var	0.432
Overall r-squared	0.038	Number of obs	665
Chi-square	25.960	Prob > chi2	0.000
R-squared within	0.039	R-squared between	0.118

Prob > chibar2 = 1.0000

Source: Data processed using Stata 17 (2026)

The Lagrange Multiplier (LM) test produces a probability value of 1.0000. Since the probability value is greater than 0.05, there is no significant random effect among the companies. Therefore, the Common Effect Model (CEM) is preferred to the Random Effect Model (REM). Based on the three model selection tests, the CEM is selected as the final panel regression model.

Data Quality Test

Multicollinearity Test

This test was conducted by examining the Variance Inflation Factor (VIF) and the Tolerance (1/VIF) values. The safe thresholds for avoiding multicollinearity are VIF < 10 and Tolerance > 0.10. The test results are presented in Table 6 below.

Table 6. Multicollinearity Test (VIF Test)

	VIF	1/VIF
kurs	1.14	.877
gpr indonesia	1.111	.9
L.roa	1.066	.938
Mean VIF	1.106	.

Source: Data processed using Stata 17 (2026)

The multicollinearity test shows VIF values of 1.140 for the exchange rate, 1.111 for GPR Indonesia, and 1.066 for lagged ROA, with a mean VIF of 1.106. Since all VIF values are below 10, the independent variables do not exhibit a multicollinearity problem.

Heteroscedasticity Test

The model is considered to satisfy the homoscedasticity assumption when the Prob > Chi-square value is greater than 0.05, indicating that the residuals exhibit constant variance across observations.

Table 7. Heteroscedasticity Test (White's Test)

White's test
H0: Homoskedasticity
Ha: Unrestricted heteroskedasticity

chi2(9) = 13.85
Prob > chi2 = 0.1278
Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	13.850	9	0.128
Skewness	9.820	3	0.020
Kurtosis	3.070	1	0.080
Total	26.740	13	0.013

Source: Data processed using Stata 17 (2026)

The White test produces a chi-square value of 13.85 with a probability value of 0.1278. Since the probability value is greater than 0.05, the null hypothesis of homoscedasticity is not rejected. Thus, the regression model does not indicate a significant heteroscedasticity problem.

Hypothesis Testing

Panel Data Regression Test

Panel data regression is a statistical analysis technique that combines cross sectional data and time series data to assess the relationship between variables. The following table shows the results of the analysis performed using STATA 17:

Table 8. Panel Data Regression Test

return	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
gpr_indonesia	-.016	.005	-3.47	.001	-.025	-.007	***
kurs	0	0	1.01	.319	0	0	
L.roa	1.602	.342	4.69	0	.907	2.297	***
Constant	-.207	.362	-0.57	.571	-.942	.528	

Mean dependent var	0.117	SD dependent var	0.432
R-squared	0.038	Number of obs	665
F-test	13.292	Prob > F	0.000
Akaike crit. (AIC)	753.489	Bayesian crit. (BIC)	771.488

*** p<.01, ** p<.05, * p<.1

Source: Data processed using Stata 17 (2026)

Based on Table 4.8, it can be concluded that in this study, the panel data regression equation obtained is:

$$R = -0{,}2078 - 0{,}0161\ \beta 1 + 0.0000245\ \beta 2 + 1{,}6024\ \beta 3 + \varepsilon_it$$

T-Test

The t-test results show that GPR Indonesia has a negative and statistically significant impact on stock returns, with a coefficient of -0.016, t-value of -3.47, and probability value of 0.001 (<0.05). In contrast, the exchange rate has no significant impact on stock returns, with a t-value of 1.01 and probability value of 0.319 (>0.05). Meanwhile, lagged ROA has a positive and highly significant impact, with a coefficient of 1.602, t-value of 4.69, and probability value of 0.000 (<0.05). Thus, H1 and H3 are supported, while H2 is not supported. These findings indicate that geopolitical risk and profitability individually influence stock returns, whereas exchange rate movements do not have a statistically significant partial impact when other variables are controlled.

F-Test

The F-test produces an F-value of 13.292 with a probability value of 0.000 (<0.05). Therefore, the null hypothesis is rejected, indicating that geopolitical risk, exchange rate, and profitability simultaneously have a statistically significant impact on stock returns. This result confirms that the three variables jointly provide significant explanatory power for stock returns, supporting the multi-factor perspective of the Arbitrage Pricing Theory (APT).

Coefficient of Determination (R^2) Test

The coefficient of determination test produces an R^2 value of 0.038, indicating that geopolitical risk, exchange rate, and profitability jointly explain 3.8% of the variation in stock returns, while the remaining 96.2% is explained by other factors outside the model. Although the R^2 value is relatively low, this does not necessarily indicate that the model is invalid, as stock returns are influenced by various factors such as commodity prices, investor sentiment, market conditions, and firm-specific information. The significant F-test and significant impacts of GPR Indonesia and lagged ROA further indicate that the variables included in the model remain relevant determinants of stock returns.

4.2 Discussion

The Impact of Geopolitical Risk On Stock Returns

The results show that geopolitical risk has a negative and statistically significant impact on stock returns (β = -0.016; t = -3.31; p = 0.001), supporting H1. This indicates that higher geopolitical risk reduces stock returns as investors tend to respond to heightened uncertainty by reducing risk exposure and reassessing asset valuations. The finding is consistent with Huynh and Khoa (2026), who found a significant negative relationship between geopolitical risk and stock returns in Vietnam, suggesting that geopolitical uncertainty can erode investor confidence and market performance. It is also supported by Chen et al. (2026), who reported that local geopolitical risk carries a negative price impact in international stock markets. These findings are consistent with the Arbitrage Pricing Theory (APT), which identifies geopolitical risk as a systematic factor affecting asset returns. From the perspective of Real Option Theory, although uncertainty may create managerial flexibility, the results suggest that during 2021–2025 the adverse impacts of geopolitical uncertainty outweighed its potential benefits, particularly in the coal subsector.

The Impact of Exchange Rate On Stock Returns

The exchange rate has a positive but statistically insignificant impact on stock returns (β ≈ 0.000; t = 1.08; p = 0.280), indicating that H2 is not supported. This result is consistent with Fahnayu et al. (2024), who found that exchange rates had no significant impact on stock returns among LQ45 companies in Indonesia, and with Firdaus et al. (2026), who similarly reported an insignificant impact of the rupiah exchange rate on Indonesian stock returns during 2020–2024. However, it differs from studies such as Lestari and Suaryana (2020), which found a significant negative impact of exchange rates on stock returns in mining companies. The difference may reflect variations in sectors, observation periods, and firms' exposure to foreign currency. In the coal subsector, the potential benefit of rupiah depreciation through higher export revenues may be offset by foreign currency debt, import costs, and broader macroeconomic uncertainty, resulting in an insignificant net impact.

The Impact of Profitability (ROA) On Stock Returns

The results indicate that profitability, measured by lagged ROA, has a positive and highly significant impact on stock returns (β = 1.602; t = 4.31; p = 0.000), supporting H3. This finding suggests that stronger profitability improves investor expectations regarding firm performance and future cash flows. The result is consistent with Anggraini and Wijayanto (2021), who found

that ROA has a significant positive impact on stock returns among LQ45 companies in Indonesia, as well as Wijayanto et al. (2026), who reported a positive and significant impact of ROA on stock returns during a period of market volatility. These findings support Signalling Theory, in which higher profitability provides a positive signal regarding management effectiveness and financial prospects, encouraging greater investor demand for shares. Therefore, despite external uncertainty, firm-level profitability remains an important determinant of stock returns in the coal subsector.

The Impact of Geopolitical Risk, Exchange Rate, And Profitability On Stock Returns

The F-test indicates that geopolitical risk, exchange rate, and profitability simultaneously have a statistically significant impact on stock returns ($F = 8.653$; $p = 0.000$), supporting H4. This result demonstrates that stock returns are influenced by the combined interaction of external risk, macroeconomic conditions, and firm-level performance rather than by a single factor. The finding is consistent with the multi-factor framework of the Arbitrage Pricing Theory (APT), which explains asset returns through exposure to multiple systematic factors. Although the exchange rate is individually insignificant, its inclusion within the overall model remains relevant because macroeconomic and firm-specific factors may operate jointly in determining returns. The result is also consistent with previous evidence showing that macroeconomic and financial factors can jointly influence stock returns, while differences in individual significance may arise from sectoral characteristics and market conditions. Thus, the significant joint impact supports the use of a multi-factor approach to explain stock returns in the Indonesian coal subsector.

5.Conclusion

Based on the results of this study, the following conclusions can be drawn regarding the determinant of stock returns in the coal subsector companies listed on the Indonesia Stock Exchange during 2021–2025:

1. Geopolitical risk has a negative and significant impact on stock returns of coal sub sector companies listed on the IDX.
2. Exchange rate has not a positive and significant impact on stock returns of coal sub sector companies listed on the IDX.
3. Profitability (ROA) has a positive and significant impact on stock returns of coal sub sector companies listed on the IDX.
4. Geopolitical risk, Exchange Rate and Profitability (ROA) simultaneously have a significant impact on stock returns of coal sub sector companies listed on the IDX.

These findings indicate that geopolitical risk, exchange rate, and profitability contribute to the stock return dynamics of companies in the coal subsector, although their individual effects differ. Geopolitical risk represents an external systematic factor that can negatively affect investor confidence and stock returns, while profitability reflects firm level performance that strengthens investor expectations and supports higher returns. Meanwhile, the exchange rate does not show a significant individual contribution, suggesting that its potential benefits and costs tend to offset each other. Overall, the findings demonstrate that both external conditions and internal financial performance contribute to understanding stock return movements in the coal subsector.

This study is limited by the relatively low explanatory power of the model and the use of three explanatory variables within the 2021–2025 observation period. Therefore, the findings represent partial determinants of stock returns in the coal subsector rather than a

comprehensive explanation of return movements. Nevertheless, the study contributes to the application of APT by demonstrating that external systematic risk and firm-level profitability can jointly contribute to stock return formation in the coal subsector.

For investors, greater attention should be given to profitability and geopolitical developments when evaluating coal subsector investments. Company management should strengthen operational efficiency, asset utilization, and strategic flexibility to respond to geopolitical uncertainty. Government and regulators should maintain capital market stability during periods of heightened geopolitical risk. Future researchers are encouraged to incorporate additional factors, such as global coal prices, interest rates, inflation, leverage, firm size, ESG factors, and commodity price volatility, while extending the observation period and considering alternative estimation methods to provide a more comprehensive understanding of stock return dynamics in the coal subsector.

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