

Examining the effects of ESG performance and inflation on stock return dynamics

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Abstract

This study examines the influence of profitability, inflation, and Environmental Social Governance (ESG) performance on stock returns in coal mining companies listed on the Indonesia Stock Exchange during 2020–2024. The study is motivated by inconsistent empirical findings regarding the effects of financial performance, macroeconomic conditions, and sustainability practices on stock return dynamics. A quantitative panel-data approach is employed using multiple regression and Moderated Regression Analysis (MRA). Inflation is proxied by the Consumer Price Index (CPI), ESG performance is measured using Bloomberg ESG Disclosure Scores, profitability is measured by Return on Assets (ROA), and firm value is proxied by Price to Book Value (PBV). The results indicate that inflation negatively affects stock returns, ESG performance positively affects stock returns, while profitability shows no significant effect. Firm value strengthens the relationships between the independent variables and stock return. These findings highlight the growing importance of sustainability performance and market valuation in shaping investor behavior.

Keywords

Inflation, ESG, Stock return, Firm value, Coal mining

Introduction

The capital market plays a crucial role in supporting economic activities, especially in countries adopting a market-based economic system [1]. Investors domestic and foreign are increasingly attracted to equity instruments due to their potential for providing higher returns relative to traditional savings and deposits. Investment represents a deliberate sacrifice of current resources for future gain [2], and stock return becomes the key metric reflecting the effectiveness of such investment decisions. Stock return refers to the gains derived from the difference between the purchase and selling price of shares [3] or expected future dividends and capital gains [4].

To evaluate the performance and prospects of firms, investors rely on financial information presented through financial statements [5]. These statements provide

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insights into financial position, profit generation capability, and cash flow stability [6]. In this context, various internal and external factors have been identified in previous studies as determinants of stock returns, including profitability [1]; [7], inflation [4]; [8], leverage [11], liquidity [12], company size [13], market ratios [21], and sustainability performance through ESG [14]; [15].

Despite extensive research, findings remain inconsistent. For instance, studies such as [4] and [8] found that profitability does not affect stock returns. Conversely, [7] documented a positive and significant influence. Similarly, while the majority of evidence suggests inflation negatively affects stock returns [9]; [8], other research [10] reports no significant effect. ESG performance also demonstrates mixed findings some show positive effects [14]; [15], while [19] found negative effects and [18] found no effect.

The coal mining sub-sector offers a unique empirical setting. It is characterized by high operational risk, large capital requirements, and volatility driven by global commodity cycles and policy shocks. For example, the surge in global nickel demand in 2021 led to significant increases in stock prices of companies such as PT Aneka Tambang Tbk (ANTM). Conversely, the government's nickel export ban in 2020 created short-term volatility for companies like PT Vale Indonesia Tbk (INCO). External crises, such as the COVID-19 pandemic, depressed coal demand, affecting firms like PT Bukit Asam Tbk (PTBA), before the sector rebounded as global demand recovered. These phenomena demonstrate that stock returns in the Indonesian mining sector are highly sensitive not only to internal performance but also to macroeconomic conditions, sustainability pressures, and market perceptions. Thus, a moderating variable may be necessary to explain inconsistencies in previous findings.

Firm value, frequently measured using the Price to Book Value (PBV), reflects market perceptions of a company's future prospects [16]. PBV captures investors' assessment of whether a firm is generating value beyond contributed capital [17]. Previous studies suggest that firm value can strengthen or weaken the impact of internal and external factors on stock returns [18], making it a theoretically relevant moderating variable. However, empirical research examining firm value as a moderator in the relationship between profitability, inflation, ESG, and stock returns in the coal mining sector remains limited. This constitutes the research gap the current study aims to address.

The dynamics of stock returns in environmentally sensitive industries, particularly coal mining, remain difficult to explain. Prior studies report inconsistent findings regarding the roles of profitability, inflation, and ESG performance. Some studies find profitability significant, while others do not. Inflation is frequently reported as detrimental to stock performance, yet several studies show insignificant effects. Similarly, ESG performance demonstrates conflicting empirical results, ranging from positive to negative influences. These inconsistencies suggest that existing models may overlook an important conditioning factor. Coal mining firms operate under high uncertainty driven by macroeconomic pressures, regulatory interventions, and sustainability concerns.

Consequently, firm value may alter how financial, macroeconomic, and sustainability factors influence stock returns. However, empirical evidence examining firm value as a moderating variable in these relationships, particularly in the Indonesian coal mining sector, remains limited. This study addresses that gap.

This study contributes to the literature in three ways. First, it integrates profitability, inflation, and ESG performance within a unified framework to explain stock return behavior. Second, it introduces firm value as a moderating variable, a mechanism rarely examined in ESG–stock return studies. Third, it focuses on coal mining firms, an industry exposed simultaneously to environmental scrutiny and macroeconomic volatility. The novelty therefore lies in the integrated model, moderating structure, and industry-specific context.

Method

This study uses a quantitative associative–causal design, aiming to test the causal effect of profitability, inflation, and Environmental Social Governance (ESG) on stock returns, as well as the moderating role of firm value. The quantitative design allows objective hypothesis testing based on numerical secondary data. Because the study does not introduce a new laboratory-based procedure, the research design follows established methods widely used in financial empirical studies [4]; [8].

This study employs a quantitative panel-data design. The sample consists of coal mining companies listed on the Indonesia Stock Exchange during 2020–2024, selected using purposive sampling based on data completeness and ESG score availability. Stock return is the dependent variable. Profitability is measured using Return on Assets (ROA), inflation is proxied by the Consumer Price Index (CPI), ESG performance is measured using Bloomberg ESG Disclosure Scores, and firm value is proxied by Price to Book Value (PBV). Sampling was conducted using purposive sampling. Variables measured include:

1. Stock Return (dependent variable): calculated from changes in stock prices across periods [11].
2. Profitability: measured using Return on Assets (ROA) [8].
3. Inflation: proxied using the Consumer Price Index [2].
4. ESG: measured using Bloomberg ESG Disclosure Score [14].
5. Firm Value (moderator): proxied by Price to Book Value (PBV) [16].

The regression model is specified as:

$$Y = \alpha + \beta_1ROA + \beta_2INF + \beta_3ESG + \beta_4PBV + \beta_5(ROA \times PBV) + \beta_6(INF \times PBV) + \beta_7(ESG \times PBV) + \epsilon$$

Data were processed using statistical software. Classical assumption tests included normality, multicollinearity, heteroscedasticity, and autocorrelation tests. Analytical techniques included descriptive statistics, classical assumption tests, multiple regression analysis, and Moderated Regression Analysis (MRA).

Results and discussion

Results

The F-test results demonstrate that profitability, inflation, and ESG jointly influence stock returns, confirming that the overall model is statistically fit. The ANOVA output indicates a significance value below 0.05, meaning the independent variables collectively explain a meaningful portion of stock return variability [Table 1](#).

Table 1. F-test result

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	217706.380	4	54426.595	6.543	.000 ^b
	Residual	665430.945	80	8317.887		
	Total	883137.325	84			

a. Dependent Variable: Return Saham

b. Predictors: (Constant), Nilai Perusahaan, Inflation, ESG, Profitability

The Moderated Regression Analysis (MRA) was conducted to examine whether firm value strengthens or weakens the relationships between profitability, inflation, ESG performance, and stock return. This technique evaluates the interaction effects created by multiplying each independent variable with the moderating variable. The results of the MRA estimation are presented in [Table 2](#).

Table 2. Measured regression analysis (MRA) result

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.002	.011		-.220	.826
	X1	.003	.009	.014	.319	.750
	X2	-.009	.001	-.883	-18.707	.014
	X3	.946	.057	.772	16.644	.000
	X1.Z	.231	.099	.181	2.329	.022
	X2.Z	.057	.023	.220	2.513	.000
	X3.Z	.380	.071	.488	5.344	.000

Source: data processed, 2025

Based on the estimation output, the regression equation of the moderating model is as follows:

$$Y = -0.002 + 0.003X_1 - 0.009X_2 + 0.946X_3 + 0.231X_1Z + 0.057X_2Z + 0.380X_3Z$$

The constant value of -0.002 indicates that, when all predictors are held constant, the baseline stock return is -0.002 . The coefficient of profitability (X_1) is positive (0.003), suggesting that a 1% increase in profitability corresponds to a 0.003 increase in stock return. Conversely, inflation (X_2) shows a negative coefficient (-0.009), meaning that higher inflation reduces stock return. ESG performance (X_3) displays a strong positive coefficient (0.946), indicating a substantial contribution of ESG to improving stock return.

The moderating role of firm value is reflected in the interaction coefficients. The interaction between profitability and firm value ($X_1Z = 0.231$) increases stock return, showing that firm value enhances the influence of profitability. Similarly, the interaction between inflation and firm value ($X_2Z = 0.057$) indicates that firm value also strengthens the effect of inflation on stock return, although to a lesser degree. The interaction term for ESG ($X_3Z = 0.380$) demonstrates that firm value amplifies the positive impact of ESG performance on stock return.

Overall, the positive and significant interaction coefficients confirm that firm value functions as a strengthening moderator, reinforcing the influence of all three independent variables on stock return.

Discussion

The results show that profitability does not have a significant effect on stock return, as indicated by the t-significance value of 0.750 (>0.05) with a coefficient of 0.003 (Table 2). This finding implies that fluctuations in profitability are not sufficiently influential to drive investor responses in the coal mining sector. According to the efficient market perspective, stock prices are more affected by future expectations than by current profitability. External forces such as macroeconomic conditions, regulatory pressure, global energy transitions, and market sentiment often dominate investment decision-making in coal companies. As noted in prior research, profitability may show inconsistent effects on stock return across industries [3]; [1] supporting the non-significant outcome in this study.

Inflation has a negative and significant effect on stock return, with a coefficient of -0.009 and a significance value of 0.014 (Table 2). Inflation decreases purchasing power, elevates production costs, and pushes operational expenses upward, thereby reducing firm profitability. Within coal mining, rising inflation intensifies fuel, labor, and logistics costs, leading to reduced earnings and weaker investor confidence. These results are consistent with earlier findings showing that inflation negatively impacts stock returns [9]; [8]; [20]. Even though coal prices often rise during inflationary cycles, the negative cost-push effect tends to outweigh potential revenue gains. Thus, inflation serves as a macroeconomic pressure that erodes investor return expectations.

ESG exhibits a positive and significant effect on stock return, as shown by its coefficient of 0.946 with a significance value of 0.000 (Table 2). This finding aligns with previous research indicating that companies implementing environmental, social, and governance initiatives are perceived as more efficient, transparent, and sustainable [14]; [15]. ESG practices enhance company reputation, reduce long-term risk, and attract investors seeking responsible and forward-looking business models. In high-impact sectors such as coal mining, strong ESG performance also signals operational compliance and environmental accountability, further strengthening investor trust. As supported in the original manuscript, companies like PT Adaro Energy Indonesia Tbk

successfully attract institutional investors due to renewable energy expansion and transparent governance reporting.

Firm value significantly strengthens the relationship between profitability and stock return, as reflected by the significant interaction coefficient of 0.231 (sig. 0.022) (Table 2). High-value firms are perceived as more credible and growth-oriented, leading investors to respond more positively to profitability signals. This supports signalling theory, where firm value acts as an indicator of market confidence and amplifies the responsiveness of investors to internal performance metrics. As stated in the original discussion, firm value serves as a catalyst that enhances how profitability translates into stock return, especially for coal firms with strong market positioning.

Firm value also strengthens the relationship between inflation and stock return, indicated by the significant interaction coefficient of 0.057 (sig. 0.014) (Table 2). This finding shows that even though inflation generally reduces stock return, companies with high firm value are better able to maintain stability due to stronger financial resilience, better governance, and market confidence. The discussion in the manuscript explains that high-value firms tend to withstand inflationary pressures through superior adaptation strategies and stronger bargaining power. An empirical illustration is PT Bukit Asam Tbk, which mitigates inflationary cost increases through product diversification and solid corporate governance, enabling stable investor returns despite inflationary conditions.

Firm value significantly strengthens the positive relationship between ESG and stock return, supported by the interaction coefficient of 0.380 (sig. 0.000) (Table 2). Companies with high valuation are perceived as having strong future prospects; thus, their ESG initiatives generate greater investor enthusiasm. According to the manuscript, high firm value amplifies the reputational benefits of ESG practices because investors view sustainability as a competitive advantage in long-term value creation. This leads to stronger market responses to ESG disclosures, resulting in increased investor interest and higher stock returns [18]; [19]. Firm value, therefore, serves as a catalyst that reinforces the strategic impact of ESG performance.

The findings indicate that inflation negatively influences stock returns, supporting macroeconomic theory. ESG performance shows a positive effect, suggesting that sustainability practices enhance investor confidence. Profitability does not significantly affect stock returns, implying that external factors dominate investor decision-making in the coal sector. Firm value strengthens these relationships, indicating that market valuation plays a critical conditioning role.

Conclusion

This study was conducted to examine the effects of profitability, inflation, and ESG performance on stock return, as well as the moderating role of firm value in coal mining companies listed on the Indonesia Stock Exchange. The findings show that profitability

does not significantly influence stock return, indicating that investors in this industry tend to rely more on external market conditions than on internal profitability indicators. Inflation demonstrates a negative and significant impact, confirming that macroeconomic pressure plays a decisive role in diminishing investor returns. Meanwhile, ESG performance shows a strong positive relationship with stock return, suggesting that sustainability practices have become an increasingly important signal for investors, even in resource-intensive industries such as coal mining.

The moderating analysis reveals that firm value strengthens all observed relationships, meaning that companies with higher valuation are more responsive to internal and external performance drivers. This highlights the strategic role of market perception and valuation in shaping investor reactions. Together, these findings contribute to the growing body of knowledge by integrating financial, macroeconomic, and sustainability dimensions within a single analytical framework, offering a more comprehensive understanding of stock return behavior in the coal sector.

Scientifically, the research advances prior studies by demonstrating that ESG performance and firm value play a more decisive role than profitability in influencing stock return within industries heavily affected by global market sentiment. This reinforces the importance of sustainability and valuation-based moderation in capital market analysis.

For future research, expanding the model by incorporating additional macroeconomic variables, such as exchange rates or interest rates, or applying the framework to different sectors could provide a broader perspective. Further exploration of alternative ESG measurement approaches may also enhance the robustness of sustainability-related findings.

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