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THE EFFECT OF SYSTEMATIC RISK AND IDIOSYNCRATIC RISK ON INVESTMENT RETURNS WITH ESG DISCLOSURE AS A MODERATING VARIABLE IN INDONESIAN AGRO-INDUSTRIAL COMPANIES

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ABSTRACT
In the face of complex market dynamics, companies are required to effectively manage investment risks while simultaneously implementing responsible sustainability practices. This study aims to analyze the effects of systematic risk and idiosyncratic risk on investment returns, as well as the moderating role of Environmental, Social, and Governance (ESG) disclosure in the relationship between these two types of risk and investment returns in Indonesian agro-industrial companies. Using a quantitative approach, the results reveal that systematic risk has a significant negative effect on investment returns, while idiosyncratic risk has a significant positive effect. Furthermore, ESG disclosure is found to reduce the negative impact of systematic risk and strengthen the positive impact of idiosyncratic risk on investment returns. These findings indicate that risk management integrated with sustainability strategies is a key factor in enhancing investment performance. Therefore, agro-industrial companies are encouraged to improve the quality and transparency of ESG disclosures as part of their risk mitigation strategies and efforts to create long-term value for investors.

Keywords: Agro-industry, ESG Disclosure, Idiosyncratic Risk, Investment Return, Systematic Risk

INTRODUCTION

During the 2019–2023 period, the agro-industrial sector held a strategic role in the structure of Indonesia's economy due to its substantial contribution to Gross Domestic Product (GDP), averaging 12.92% (Mas'ud & Wahyuningsih, 2023). The sector also supported national food security and served as a major source of foreign exchange through the export of agricultural commodities and processed products. However, over the five-year period (2019–2023), the stock performance and investment returns of companies operating in this sector exhibited significant volatility. This turbulence was further exacerbated by the outbreak of the COVID-19 pandemic in early 2020, which disrupted global supply chains, imposed restrictions on export-import activities, and weakened purchasing power—adversely impacting domestic demand.

In the first half of 2020, the stock performance of the agro-industrial sector was negatively affected by the COVID-19 pandemic, marked by a significant decline. Nonetheless, the sector demonstrated resilience, with a recovery observed in the second half of the same year, reflected in a 10.41% growth in stock performance. This upward trend continued into the first quarter of 2021, with an additional increase of 1.35%. As the pandemic subsided, the sector's stock performance strengthened further in early 2023, with year-on-year (YoY) growth reaching 14.28%. In addition to post-pandemic recovery, external factors such as the Russia–Ukraine geopolitical conflict also contributed to this momentum. The conflict disrupted the global sunflower oil supply chain, leading to a surge in crude palm oil (CPO) prices to record highs during 2022–2023. This situation provided a strategic advantage for Indonesia's agro-industrial issuers, as the country is a leading global CPO producer—reflected in a significant increase in stock performance.

Despite the temporary recovery in 2021–2022, particularly in the plantation subsector driven by rising commodity prices such as CPO, these conditions were insufficient to create long-term investment return stability. Global uncertainties arising from geopolitical crises, exchange rate fluctuations, and climate change threats continued to pose challenges to the sector's sustainability through the end of 2023.

Agro-industrial companies experienced unstable stock return patterns, with sharp fluctuations in response to various pressures—ranging from systemic risks such as macroeconomic conditions and global market volatility, to idiosyncratic risks stemming from internal company dynamics. This situation underscores the importance of understanding information content, namely the extent to which the information disclosed by companies can influence investor perceptions. The higher the quality and relevance of disclosed information, the greater its impact on stock price movements and investment decisions in the capital market.

The concept of information content is closely associated with the Efficient Market Hypothesis (EMH) proposed by Fama (1970), which posits that markets react rationally to new information. However, in emerging markets such as Indonesia, market reactions are often influenced by limited information, information asymmetry, and risk uncertainty—thereby reducing market efficiency and increasing return volatility. One of the main drivers of return fluctuation is risk, which can be broadly categorized into systematic and idiosyncratic risks. Systematic risk refers to broad market risks that cannot be eliminated through diversification and includes macroeconomic factors such as inflation, interest rates, exchange rates, and geopolitical tensions. This type of risk is reflected in stock beta coefficients within the Capital Asset Pricing Model (CAPM) framework. On the other hand, idiosyncratic risk is company-specific, encompassing factors such as internal management, operational efficiency, and strategic decisions. These risks are unaffected by general market conditions and can be mitigated through portfolio diversification.

Studies by Maiti (2019) and Sidiq et al. (2024) indicate that investors take both types of risks into account when making investment decisions, and both significantly affect stock return volatility—particularly in industries vulnerable to environmental and social factors such as agro-industry.In this context, global awareness of sustainability and ESG (Environmental, Social, and Governance) issues continues to rise. Agro-industrial companies are under increasing pressure f rom investors, consumers, and regulators to demonstrate environmentally friendly operations, socially responsible practices, and ethical corporate governance. Therefore, ESG disclosure is not only a manifestation of social responsibility but also serves as a credibility signal for corporate governance transparency—aligned with Signaling Theory by Spence (1973). High-quality ESG disclosures can reduce information asymmetry and strengthen investor confidence.

One of the most prominent ESG issues in recent years is the European Union's policy on the import ban of CPO related to deforestation. Under the European Union Deforestation Regulation (EUDR), beginning at the end of 2025, the EU will prohibit the import of products such as CPO that are linked to post-2020 deforestation (Blenkisop, 2024). Indonesia has responded to this regulation by labeling it as discriminatory against developing country exporters and has pursued diplomatic recourse through the WTO.

This EU policy has triggered a decline in Indonesian CPO exports to the European market and influenced the approach of global investors toward palm oil companies. As such, ESG considerations have become increasingly critical, with investors now demanding evidence that production practices are deforestation-free, traceable, and compliant with global regulations. Through transparent ESG disclosure, agro-industrial firms can not only maintain market access to the EU but also enhance their perceived reliability and sustainability among investors—ultimately lowering capital costs and improving investment return stability.

Several previous studies have found that ESG disclosure can moderate the relationship between risk and stock return. Research by Yusra I et al. (2022) and Cam S et al. (2024) reveals that both systematic and idiosyncratic risks have a positive and significant impact on investment returns. Broadstock et al. (2021) found that firms with high ESG scores exhibited more stable stock returns during the COVID-19 crisis. Fu & Jia (2025) also showed that ESG disclosure mitigated the negative impact of systematic risk on market

reactions. Moreover, Sugianto et al. (2022) found that ESG disclosure enhances investors' perceptions of corporate prospects, thereby strengthening the informational value of financial reports. However, in Indonesia—particularly within the agro-industrial sector—empirical studies examining how ESG disclosure moderates the effect of systematic and idiosyncratic risks on investment returns remain limited. This is concerning, given the sector's high sustainability urgency due to its reliance on natural ecosystems and local communities. Therefore, this study aims to comprehensively examine ESG disclosure as a moderating variable in the relationship between systematic and idiosyncratic risks and investment returns in Indonesian agro-industrial firms.

Based on the above background, this study aims to analyze the effects of idiosyncratic and systematic risks on investment returns, as well as examine the moderating role of ESG disclosure in these relationships—focusing on agro-industrial companies listed on the Indonesia Stock Exchange during the 2019–2023 period. This research is expected to contribute theoretically to the development of sustainable finance literature and provide practical insights for investors, managers, and regulators in managing risks and making informed investment decisions.

Research Questions

Does systematic risk affect investment returns in agro-industrial companies in Indonesia?
Does idiosyncratic risk affect investment returns in agro-industrial companies in Indonesia?
Does ESG disclosure moderate the relationship between systematic risk and investment returns in agro-industrial companies in Indonesia?
Does ESG disclosure moderate the relationship between idiosyncratic risk and investment returns in agro-industrial companies in Indonesia?

LITERATURE REVIEW

Signaling Theory

Spence (1973) defines signaling theory as a framework for understanding the behavior of two parties who have access to different and incomplete information. The theory posits that information holds intrinsic value for both parties: the signal sender (the company providing the information) and the signal receiver (the investor interpreting it). Signaling theory addresses how firms can reduce information asymmetry. According to Morris (1987), companies are expected to disclose more information to minimize this asymmetry.

Information asymmetry may arise when corporate managers conceal actual economic conditions for personal gain by using selective accounting methods or assumptions. Managers may convey either positive or negative signals about company performance to engage in earnings management, aiming to influence shareholders and other stakeholders. Reliable disclosure is thus essential to reduce asymmetry and enhance trust. High-quality firms are more likely to disclose ESG performance alongside financial reports, whereas low-quality firms tend to limit disclosure to basic accounting information (Seker & Sengür, 2021).

Efficient Market Hypothesis (EMH)

First introduced by Eugene Fama (1965), the Efficient Market Hypothesis states that asset prices in the capital market reflect all available information—public and private. In an efficient market, securities prices respond swiftly and accurately to new information, forming a new equilibrium and serving as a basis for assessing investment risk. Fama classifies market efficiency into three levels: (1) weak-form efficiency (historical price data), (2) semi-strong efficiency (historical and public data), and (3) strong-form efficiency (including insider information). These levels help assess how quickly and accurately markets react to new information. In highly efficient markets, it becomes difficult for investors to consistently earn abnormal returns, making it vital to test efficiency levels before formulating investment strategies.

Systematic Risk
The concept of risk, first introduced by Knight (1921), distinguishes risk from uncertainty, defining it as the variability in investment outcomes that deviate from expectations. Investment efficiency is measured by the ability to yield optimal returns at minimal risk. Systematic risk, also known as non-diversifiable risk, cannot be mitigated through diversification. It stems from macroeconomic factors such as interest rates, exchange rates, market volatility, and government policy (Gregory et al., 2014). While Yusra et al. (2022) argue that systematic risk is typically measured using beta (β), which represents a stock's sensitivity to market fluctuations. A higher beta indicates greater risk, making it a relevant metric to evaluate an asset's contribution to portfolio risk.

Idiosyncratic Risk
Idiosyncratic risk is firm-specific and independent of market movements. It originates from internal factors such as business strategy and managerial decisions (Maiti et al., 2019). Strong corporate governance is associated with lower idiosyncratic risk, especially in the governance aspect of ESG. Idiosyncratic risk is relevant due to investors' limited diversification capacity (Zhang et al., 2020), and it is influenced by internal disclosures, earnings reports, industry regulation, and competitive dynamics. It is typically measured using the residual variance from market models or through Fama-French (1993, 2017) frameworks. Idiosyncratic volatility reflects potential hidden managerial weaknesses and internal instability.

ESG Disclosure
Non-financial information is captured through Environmental, Social, and Governance (ESG) disclosure, serving as an indicator of corporate sustainability (Pulino et al., 2022). ESG disclosures indicate a firm's transparency and provide a framework for evaluating business continuity (Gregory et al., 2014). Global concerns such as climate change and social welfare have encouraged firms to issue sustainability reports as signals to reduce information asymmetry. ESG disclosure also serves as a proxy for both systematic and idiosyncratic risks. Furthermore, ESG disclosure positively correlates with financial performance and corporate accountability (Reber et al., 2022). ESG has become central to global investment decisions (IDX, 2023), supported by agencies such as Bloomberg, MSCI, Refinitiv, and NASDAQ (Keeley et al., 2023). Firms that proactively disclose ESG are more trusted by investors and stakeholders, enhancing firm value and long-term reputation. ESG integration also drives corporate adaptability to evolving environmental, social, and governance challenges.

Investment Return
Investment return refers to the gain or loss experienced by investors during a specific period—either as capital gains or income—and is a key indicator of stock performance (Jogiyanto, 2010). Return serves as a reward for the risks undertaken. To evaluate the impact of specific events, the Cumulative Abnormal Return (CAR) method is employed, representing the total deviation of actual returns from expected returns based on models such as CAPM or market-adjusted models. CAR is widely used to assess market reactions to events like ESG disclosures or mergers, with positive CAR values reflecting optimistic investor sentiment (Kusumawati et al., 2022).

Prior Studies
This study draws on prior research addressing ESG and investment risks. Reber et al. (2022) found that ESG disclosure reduces firm-specific risk and post-IPO volatility while enhancing reputation. Cerqueti et al. (2021) highlighted that funds with high ESG ratings experience lower losses but higher concentration risk. Giese et al. (2019) noted that ESG-rated firms tend to be more profitable, pay higher dividends, and enjoy lower risk and capital costs. While Yusra & Rahmi (2022) reported that systematic risk significantly and positively influences returns, while Cam et al. (2024) found that idiosyncratic risk also positively affects investment returns. Gunawan & Anggraini (2024) added that the market positively responds to firms with strong ESG performance. However, few studies have explored ESG

disclosure as a moderating variable in the relationship between systematic/idiosyncratic risk and investment return. This study aims to address this gap by providing recent empirical evidence.

HYPOTHESIS

The Effect of Systematic Risk on Investment Return

Systematic risk refers to macroeconomic risks such as inflation, interest rate fluctuations, exchange rate volatility, and global crises—factors that cannot be eliminated through portfolio diversification. In the Capital Asset Pricing Model (CAPM) framework (Yusra & Rahmi, 2022), systematic risk is measured using beta, which represents a stock's sensitivity to overall market movements. In Indonesia's agro-industrial sector, companies are highly exposed to external variables such as global commodity prices (e.g., CPO, coffee, sugar), international trade policies (e.g., the EU's CPO import restrictions), and climate-related risks. Consequently, firms in this sector face elevated levels of systematic risk, leading investors to demand higher returns as compensation.

According to Signaling Theory (Spence, 1973), elevated risk levels can serve as a signal for investors to reassess return potential—especially when accompanied by transparent information disclosure and sound corporate governance.Furthermore, under the Efficient Market Hypothesis (Fama, 1970), capital markets will swiftly incorporate information related to a firm's systematic risk into its stock price. However, emerging markets such as Indonesia tend to exhibit semi-strong efficiency, whereby public information like beta is only gradually reflected in asset prices. Empirical studies, including Yusra & Rahmi (2022), find that systematic risk has a significant impact on stock returns in agriculture-based industries. Similarly, Ningrum & Hermuningsih (2020) identified market beta as a key predictor of stock returns for export-oriented firms, particularly during economic turbulence. Based on this theoretical and empirical foundation, the following hypothesis is proposed:
H1: Systematic risk has a significant effect on investment return in agro-industrial firms in Indonesia.

The Effect of Idiosyncratic Risk on Investment Return

Idiosyncratic risk refers to firm-specific uncertainties stemming from internal factors such as management performance, cost structure, expansion strategies, or operational efficiency. Unlike systematic risk, idiosyncratic risk can be reduced through portfolio diversification. However, in practice—especially within emerging markets like Indonesia—retail investors often lack optimal diversification, rendering idiosyncratic risk a significant determinant of actual investment returns.

In the agro-industrial sector, company-specific risks such as weather dependency, land conflicts, illegal land clearing, and input cost fluctuations can cause stock returns to be highly susceptible to non-market shocks. Under Signaling Theory (Spence, 1973), high firm-specific risk may be interpreted by speculative or risk-tolerant investors as an opportunity for higher returns.

Empirical research supports the positive relationship between idiosyncratic risk and investment return. Çam et al. (2024) reported that stocks with high idiosyncratic volatility often yield higher returns in less efficient markets. In the Indonesian context, Sianturi & Feryanto (2023) found that during 2020–2022, agro-industrial firms affected by COVID-19 exhibited disproportionate stock return spikes as investors speculated on commodity price rebounds. These findings suggest that investors may view idiosyncratic risk as an opportunity rather than a threat. Therefore, the following hypothesis is formulated:
H2: Idiosyncratic risk has a significant effect on investment return in agro-**industrial firms** in Indonesia.

The Moderating Role of ESG Disclosure in the Relationship Between Idiosyncratic Risk and Investment Return

Idiosyncratic risk originates from internal company factors such as operational efficiency, land disputes, legal challenges, or weather and geographic dependency—all of which are prevalent in Indonesia's agro-industrial sector. These risks are difficult to predict using macroeconomic indicators and contribute to investor uncertainty. In this context, Environmental, Social, and Governance (ESG) disclosure plays a critical role as a signal of transparency and management commitment in mitigating these internal risks.

According to Signaling Theory (Spence, 1973), firms that proactively disclose ESG performance and policies send positive signals to investors, indicating that they are aware of and responsibly managing internal risks. ESG disclosure may thus reduce the negative impact of idiosyncratic risk on returns—or even amplify its positive effect—when the risks are perceived as part of a sustainable growth strategy.

Furthermore, under the Efficient Market Hypothesis (Fama, 1970), high-quality ESG disclosure can accelerate the market's adjustment to previously asymmetric information, thereby reducing unexpected volatility from internal risks. Empirical studies by Fatemi et al. (2018) and Grewal et al. (2021) show that firms with high ESG disclosure tend to experience lower idiosyncratic risk and more stable investor perceptions. In agro-industrial contexts, ESG disclosures related to sustainable farming practices, indigenous rights, and governance transparency can strengthen investor confidence in the firm's long-term resilience. Based on this reasoning, the following hypothesis is proposed:
H3: ESG disclosure moderates the relationship between idiosyncratic risk and investment return in agro-industrial firms in Indonesia.

The Moderating Role of ESG Disclosure in the Relationship Between Systematic Risk and Investment Return

Systematic risk stems from macroeconomic factors such as inflation, interest rate fluctuations, exchange rate volatility, geopolitical tensions, and global crises—risks that cannot be eliminated through portfolio diversification. In Indonesia's agro-industrial sector, this risk is particularly pronounced due to heavy dependence on global commodity prices (e.g., CPO, coffee, sugar), international trade restrictions (e.g., EU palm oil bans), and climate change threats. These risks create uncertainty about long-term business prospects and influence both institutional and retail investment decisions.

Under the Efficient Market Hypothesis (Fama, 1970), rational investors incorporate all relevant risk information into stock valuations promptly. However, in less efficient markets, ESG disclosure can play a pivotal role in helping investors assess a firm's resilience and strategic preparedness in facing systematic risks. According to Signaling Theory (Spence, 1973), consistent and high-quality ESG disclosure conveys a positive signal that the firm is not only aware of external challenges but also has robust sustainability strategies in place. ESG disclosure may reduce investor risk perception, enhance trust, and increase investor preference for the firm's stock—even when systematic risk exposure is high. Studies such as Yin et al. (2023) indicate that ESG disclosure strengthens investor perceptions of firm resilience and positively influences investment decisions, particularly in sectors exposed to high market risk.

In Indonesia's agro-industrial sector, ESG disclosures related to climate adaptation, environmental sustainability, and supply chain governance can determine whether investors maintain their capital commitments despite systematic risk exposure. Therefore, the final hypothesis proposed is:
H4: ESG disclosure moderates the relationship between systematic risk and investment return in agro-industrial firms in Indonesia.)

METHODS

This study employs a quantitative approach, with the research population comprising agro-industrial companies listed on the Indonesia Stock Exchange (IDX). The sample was selected using purposive sampling based on the following criteria: (1) agro-industrial firms listed on the IDX during the period 2019–2023; and (2) companies that published annual reports or sustainability reports between 2019 and 2023. The data were analyzed using Moderated Regression Analysis (MRA), which is formulated as follows:

$$Y = \alpha 0 + \Sigma \beta 1 X1 + \varepsilon \quad \text{(i)}$$
$$Y = \alpha 0 + \Sigma \beta 1 X2 + \varepsilon \quad \text{(ii)}$$
$$Y = \alpha 0 + \Sigma \beta 1 X1 + \Sigma \beta 2\ X2 + \Sigma \beta 3\ (X1^*\ X2\ ) + \varepsilon \quad \text{(iii)}$$
$$Y = \alpha 0 + \Sigma \beta 1 X1 + \Sigma \beta 2\ X3 + \Sigma \beta 3\ (X1^*\ X3\ ) + \varepsilon \quad \text{(iv)}$$

Where:
Y = Cumulative Abnormal Return (CAR)
α = Constant term
β = Regression coefficient
X_1 = Idiosyncratic Risk
X_2 = Systematic Risk
X_3 = ESG Disclosure
ε = Error term

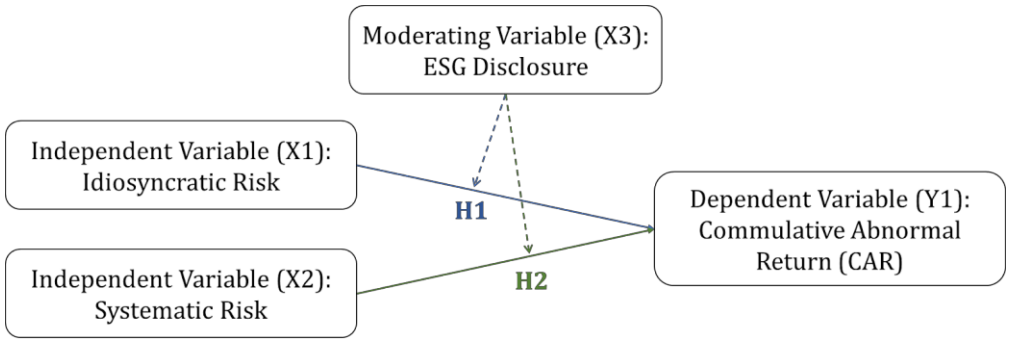

Figure 1. Research Model
Source: Processed data, 2025

Operational Definitions of Variables
Dependent Variable
The dependent variable in this study is investment return, which is measured using the Cumulative Abnormal Return (CAR). CAR is determined by calculating the actual (realized) return, expected return, and abnormal return. Actual Return (Rit) is the return that actually occurs and is calculated as:

$$Rit = (Pit - Pit\text{-}1) / Pit\text{-}1 \quad \text{(v)}$$

Where:
Rit = Return of firm i at time t; Pit = Closing price of firm i at time t; Pit-1 = Closing price of firm i at time t-1

Expected Return (Rmt) is the return anticipated by investors. This study uses IHSG as a Indonesian market benchmark.

$$Rmt = (IHSGt - IHSGt\text{-}1) / IHSGt\text{-}1 \quad \text{(vi)}$$

Where:
Rmt = Market return at time t; IHSGt = JCI value at time t; IHSGt-1 = JCI value at time t-1

Abnormal Return (ARit) is the difference between the actual return and the expected return:

$$ARit = Rit - Rmt \quad \text{(vii)}$$

Where: ARit = Abnormal return for firm i at time t

Independent Variables

Idiosyncratic Risk

Idiosyncratic risk refers to firm-specific risk arising from internal factors such as business strategy and managerial performance. This study measures it using idiosyncratic volatility, derived from the residual error in the Fama-French three-factor model (Fama & French, 1993; Lin et al., 2014):

$$Rjt = \alpha j + \beta 1 Rm,t + \beta 2 SMBjt + \beta 3 HMLjt + \varepsilon jt \quad \text{(viii)}$$

Where:Rjt = Return of firm j in month t; Rm,t = Market return in month t; SMB = Return of smallest 30% stocks minus largest 30%; HML = Return of highest 50% BTM stocks minus lowest 30%; εjt = Residual (idiosyncratic risk)

Systematic Risk

Systematic risk is measured using beta (β), which captures a stock's sensitivity to market movements. It is calculated as:

$$\beta i = Cov(Ri, Rm) / Var(Rm) = \sigma i,m / \sigma^2 m \quad \text{(ix)}$$

Where:βi = Beta for asset I; Ri = Return of asset I; Rm = Market return; σi,m = Standard deviation of asset relative to market; σm = Standard deviation of market returns

Moderating Variable

The moderating variable in this study is ESG Disclosure, which influences the strength or direction of the relationship between the independent and dependent variables. ESG disclosure is assessed using a score based on the NASDAQ ESG Reporting Guide (2019). Each ESG component disclosed in the company's sustainability report is scored using a dummy approach: Score “1” if the component is disclosed. Score “0” if not disclosed. The total score reflects the company’s commitment to transparency and sustainability performance.

RESULTS

Research Result

In this study, descriptive variables (Table 1) will be utilized to provide an overview of the participants and the context in which the research is conducted. By outlining these variables clearly, the research ensures transparency and allows readers to understand the background against which the main analysis is carried out.

Table 1. Statistic Descriptive

Variable	N	Minimum	Maximum	Mean	Std.dev
CAR	73	-0.122	0.168	0.005	0.045
Systematic Risk	73	-0.051	0.157	0.002	0.027
Idiosyncratic Risk	73	0.000	0.428	0.030	0.074
ESG	73	4.000	94.000	27.479	15.505
SRxESG	73	-1.510	1.450	0.001	0.420
IRxESG	73	0.000	4.940	0.584	0.977

Source: Processed Data (2025)

Table 2. F Test Result

	F Value	Sig.	Pred Sign
Model	4.966	0.001	***
R^2	0.270		
Adj. R^2	0.216		

Source: Processed Data (2025) *** Significant at 1%

Table 3. Hypotheses Testing Result

	Value	Coefficient	Significance	
Constanta	-0.008			
Systematic Risk	-2.093	-1.239	0.000	***
Idiosyncratic Risk	0.480	0.782	0.007	***
ESG	0.001	0.196	0.187	
SRxESG	0.101	0.922	0.000	***
IRxESG	-0.020	-0.435	0.060	*

Source: Processed Data (2025); *** Significant pada 1%; ** Significant pada 5%
* Significant pada 10%

Discussion

Systematic Risk Has a Negative and Significant Effect on Investment Returns

The results of this study reveal that systematic risk plays a significant role in reducing investment returns for agro-industrial companies in Indonesia during the period 2019 to 2023. This finding indicates that increased exposure to external risks, such as commodity price fluctuations, uncertainty in government policy directions, climate change, and global market turmoil, contributes to the decline in investment performance in the sector. Among these sources of risk, volatility in global commodity prices, particularly the instability of crude palm oil (CPO) prices, is the most dominant factor driving high systematic risk. This is due to the fact that CPO remains a key export commodity supporting the majority of revenue for domestic agro-industrial firms. In addition, other commodity prices such as rubber and cocoa, coupled with the dependence on unpredictable weather conditions, further increase the sector's vulnerability to external shocks.

Between 2019 and 2023, the agro-industry faced substantial challenges stemming from both domestic and global economic instability. The COVID-19 pandemic that emerged in early 2020 disrupted supply chains and lowered international demand, causing market risks to spike significantly. Although commodity prices improved during 2021 and 2022 (with a 42% YoY increase in 2021), geopolitical tensions and regulatory uncertainty, particularly the CPO export ban, kept market volatility elevated. These circumstances reinforced the negative effect of systematic risk, as evidenced by declining investor confidence and lower investment returns across the agro-industrial sector.

These findings serve as a warning to industry players to enhance their preparedness for external risks by diversifying export markets, improving production efficiency, and utilizing hedging instruments to mitigate commodity price and currency volatility. For investors, the high systematic risk in this sector should be a primary consideration when formulating investment strategies, particularly in terms of portfolio management and long-term firm valuation. While the industry holds significant potential, its strong reliance on external factors and global market volatility continues to pose a key challenge for investment decision-making and return performance.

Idiosyncratic Risk Has a Positive and Significant Effect on Investment Returns

The findings also demonstrate that idiosyncratic risk exerts a positive and significant influence on investment returns in agro-industrial firms. Higher idiosyncratic risk tends to increase investor confidence in the potential for abnormal returns, particularly in the context of global dynamics in the palm oil sector. During the study period, the European Union implemented CPO import restrictions on firms failing to meet sustainability and

Environmental, Social, and Governance (ESG) standards. These restrictions disrupted global palm oil supply chains and triggered price surges in the international market. As the world's largest CPO producer and exporter, Indonesia exported 33.5 million tons in 2022 (GAPKI, 2023), benefiting from rising demand and increased export value. This positioned domestic agro-industrial firms as attractive investment opportunities, with their inherent idiosyncratic volatility perceived as a profit opportunity.

Climate change, particularly extreme weather patterns such as El Niño and La Niña, also caused significant fluctuations in palm oil output during the 2019–2023 period. The 2019 El Niño resulted in prolonged droughts and widespread fires in Sumatra and Kalimantan, reducing harvest volumes. Similarly, the 2023 El Niño created rainfall deficits in key production areas such as Riau and Central Kalimantan from June to November, lowering the 2023/2024 CPO production outlook to 45.8 million tons. Conversely, the La Niña phase between 2020 and 2022 brought excessive rainfall, further reducing crop productivity. This uncertainty added to production variability across firms. For long-term investors, companies capable of managing climate impacts through adaptive strategies and sustainable practices were seen as having a competitive edge and higher return potential. Thus, the study affirms that investors do not necessarily avoid firm-specific risks but rather use them as a strategic basis to optimize investment returns.

ESG Disclosure Strengthens the Relationship Between Systematic Risk and Investment Returns

The study further finds that the interaction between systematic risk and ESG disclosure (SR x ESG) has a positive and significant effect on cumulative abnormal returns (CAR), with a coefficient of 0.922 and a 1% significance level. This finding suggests that ESG disclosure practices can strengthen the relationship between systematic risk and investment performance, particularly in the Indonesian agro-industry during the volatile 2019–2023 period. In other words, despite the external pressures faced by agro-industrial firms, including commodity price volatility, export policy uncertainty, and global economic instability, those that consistently communicate ESG performance are perceived as better at managing market perceptions, thereby mitigating the negative impact of systematic risk on returns. This result aligns with the study by Fu & Jia (2025), which indicates that ESG disclosure weakens the negative effect of systematic risk on market returns.

During the 2019–2023 period, the agro-industrial sector experienced increased exposure to systematic risk due to factors such as sharp fluctuations in CPO prices, the 2022 export ban, and intensifying global scrutiny over environmental issues such as deforestation, land degradation, and climate change. These risks raised investor concerns and negatively affected stock returns. However, firms that consistently implemented and disclosed ESG practices—related to environmental protection, social responsibility, and good corporate governance—tended to receive more favorable market responses. The positive and significant interaction between SR and ESG confirms the effectiveness of ESG practices in mitigating adverse external risks.

Moreover, this result reflects the market's growing awareness of sustainability, particularly in agro-industrial sectors frequently targeted by global environmental and social concerns. Companies with strong ESG disclosure are perceived as more resilient to external risks, helping to sustain investor trust. Thus, ESG adoption is not merely a matter of compliance or moral obligation but also a strategic tool to reduce systematic risk, improve market confidence, and enhance the global competitiveness of Indonesia's agro-industrial firms.

ESG Disclosure Weakens the Relationship Between Idiosyncratic Risk and Investment Returns

The results further show that the interaction between idiosyncratic risk and ESG disclosure (IR × ESG) has a negative and significant impact on cumulative abnormal returns (CAR), with a coefficient of -0.435 and a 6% significance level. This suggests that when firms proactively disclose information related to their Environmental, Social, and Governance

(ESG) practices, the previously positive effect of idiosyncratic risk on investment returns is mitigated.

In this context, effective ESG disclosure acts as a positive signal that firm-specific risks—such as operational disruptions, legal contingencies, or reputational issues—are being identified and responsibly managed. Therefore, investors perceive these risks as less threatening or less likely to translate into unexpected losses, which in turn reduces the return premium they would normally demand for taking on such risk.

Although the principle of "high risk, high return" typically applies in financial markets—where greater uncertainty leads to higher expected compensation—transparent ESG disclosure modifies this dynamic. Specifically, investors no longer view idiosyncratic risk as a source of potential upside, but rather as a known and managed risk. The disclosure of ESG initiatives, risk controls, and sustainable practices reassures investors, leading them to lower their expected return targets. In other words, ESG disclosure neutralizes the return-enhancing effect of idiosyncratic risk by changing investor perceptions: what was previously considered a speculative opportunity is now seen as a controlled and mitigated risk.

This interpretation aligns with signaling theory, whereby transparent disclosure acts as a credible communication channel between firms and investors. ESG practices reinforce investor confidence in the firm's long-term strategy and governance quality, reducing perceived uncertainty and volatility premiums. As a result, the return required for bearing idiosyncratic risk declines, even though the actual risk itself may still be present. These findings are consistent with Fatemi et al. (2018), who found that firms with high ESG disclosure are more effective in mitigating firm-specific risks and in attracting more stable investor attention. Investor responses to high ESG disclosure are reflected in stock price adjustments that reduce unexpected volatility and promote more stable investor sentiment. ESG practices thus serve not only as a governance mechanism but also as a risk communication tool, helping investors form rational expectations and improving the quality of investment decision-making.

Limitations and Recommendations

This study has several limitations. First, it focuses solely on agro-industrial companies in Indonesia, limiting the generalizability of the findings to other sectors. Second, the risk and ESG disclosure variables were measured using secondary data from annual and sustainability reports, which may vary in consistency and completeness. Third, the study used a linear moderation model, which may not capture potential non-linear or dynamic interactions among variables. Future research is therefore encouraged to expand the scope to other industries or cross-country comparisons, adopt more comprehensive ESG metrics such as third-party ESG ratings, and explore non-linear models or advanced quantitative methods such as Structural Equation Modeling (SEM) or Panel Vector Autoregression (PVAR) to better capture the dynamic relationships among variables.

CONCLUSION

This study aimed to examine the effects of systematic and idiosyncratic risks on investment returns and to investigate the moderating role of ESG disclosure in these relationships. The results indicate that systematic risk has a negative and significant impact on investment returns, whereas idiosyncratic risk has a positive and significant effect. Furthermore, ESG disclosure was found to reduce the negative effect of systematic risk and amplify the positive effect of idiosyncratic risk on investment returns.

The findings highlight the critical role of risk management and sustainability disclosure strategies in enhancing investment performance for agro-industrial companies in Indonesia. The significant negative effect of systematic risk on investment returns

underscores the need for firms to proactively address macroeconomic volatility and market risks. In contrast, the significant positive effect of idiosyncratic risk suggests that investors may value unique firm characteristics as indicators of potential profitability. Moreover, ESG's moderating role in both relationships confirms the strategic importance of sustainability disclosure in risk mitigation and value creation. Accordingly, agro-industrial firms are advised to improve the quality and transparency of their ESG reporting as part of a comprehensive risk management and value optimization strategy.

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