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Portfolio Excess Return Analysis for SRI-KEHATI Index Stocks: Evidence from the Fama-French Three-Factor Model

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Abstract

This study examines the determinants of portfolio excess returns within an ESG-based investment framework by applying the Fama-French Three-Factor Model to stocks listed in the SRI-KEHATI Index over the period May 2020 to November 2024. Using a quantitative explanatory approach and panel data regression, this study analyzes whether traditional asset pricing factors—market risk premium, size, and book-to-market—remain relevant in a sustainability-based investment context. The sample consists of companies consistently included in the index and selected based on data availability and completeness of financial reports. The results show that all three factors have a positive and significant effect on portfolio excess returns, indicating that traditional risk-return relationships are still applicable within ESG-based portfolios. At the same time, ESG screening appears to contribute to more stable return characteristics. This study contributes to the literature by providing empirical evidence from an emerging market context, particularly Indonesia, and shows that ESG integration complements rather than replaces traditional asset pricing models. The findings also offer practical insights for investors in constructing portfolios that balance financial performance and sustainability considerations.

Keywords

ESG investing, Fama-French three factor model, Indonesian stock market, market risk, portfolio analysis

INTRODUCTION

Investors have a wide range of alternatives to achieve their financial objectives, with financial assets increasingly preferred due to their accessibility and efficiency. Participation in the capital market—through instruments such as equities, bonds, and money market securities—provides opportunities for both wealth accumulation and corporate financing (Diva & Alit Suardana, 2023). In Indonesia, the capital market functions not only as a trading platform but also as a vital source of external funding, attracting investors with varying risk preferences. Since return remains the primary consideration in investment decisions, the inherent risk–return trade-off requires careful evaluation (Sudiyatno & Moch. Irsad, 2011).

In recent years, investment paradigms have shifted toward sustainability, where investors consider not only financial returns but also environmental, social, and governance (ESG) aspects. ESG

has become a critical benchmark for assessing corporate performance and long-term value creation, influencing portfolio construction and investment decision-making (Cornell, 2021; Jin, 2022; Xiong, 2021). (Empirical evidence suggests that ESG-based investment strategies can enhance diversification and improve risk-adjusted returns relative to conventional portfolios (Dai, 2021). Consequently, sustainability is increasingly positioned as a third dimension in investment decisions alongside risk and return (Qoyum et al., 2021).

The Sustainable and Responsible Investment-KEHATI (SRI-KEHATI) Index represents Indonesia’s leading ESG-based benchmark, developed through collaboration between the Indonesia Stock Exchange and the Indonesian Biodiversity Foundation. As one of the earliest green indices in Asia, it comprises selected firms that meet stringent financial and ESG criteria, including corporate governance, environmental performance, and social responsibility (CRMS, 2019; KEHATI, 2025; Santoso et al., 2023). The index is reviewed periodically to ensure compliance with sustainability standards and reflects a structured approach to integrating ESG considerations into investment practices.



Figure 1. Historical Index

Source: Data obtained and processed from Investing.com, 2025.

Figure 1 illustrates the long-term performance of the SRI-KEHATI Index compared to other major Indonesian indices. The index demonstrates substantial growth over time and consistently outperforms several conventional benchmarks, indicating increasing investor interest in ESG-based investments. This trend reflects a structural shift toward sustainable investment practices in the capital market. However, despite its strong historical performance, fluctuations in returns remain evident, highlighting the importance of risk–return evaluation in portfolio construction.

Table 1. Return and Standard Deviation of Index

Year	Return	JCI		SRI-KEHATI	
		Return	Std. Deviation	Return	Std. Deviation
2020	-17,9%		4,73%	-18%	0,34%
2021	19,2%		2,61%	7%	0,20%
2022	13,3%		1,68%	18%	0,22%
2023	-1,7%		1,76%	5%	0,11%
2024	5,7%		2,1%	-4%	0,27%
Average	3,7%		2,59%	2%	0,23%

Source: Data processed, 2025

Table 1 presents the comparative return and risk characteristics of the SRI-KEHATI Index and the Composite Stock Price Index (JCI). While the SRI-KEHATI Index exhibits return fluctuations, particularly during periods of economic disruption such as the COVID-19 pandemic and monetary tightening phases, it demonstrates a relatively lower level of volatility compared to the broader market. This indicates that ESG-based portfolios may offer a more stable risk profile, making them attractive for risk-averse investors while maintaining competitive returns (Santoso et al., 2023; Widati et al., 2022).

To evaluate portfolio performance, asset pricing models play a crucial role in explaining the relationship between risk and return. The Capital Asset Pricing Model (CAPM), while widely used, has been criticized for its reliance on a single risk factor and restrictive assumptions (Fama & French, 2003). Alternative approaches such as the Arbitrage Pricing Theory (APT) incorporate multiple macroeconomic factors (Ross, 1976), but empirical limitations remain. The Fama-French Three-Factor Model (FF3FM), which extends CAPM by incorporating firm size and book-to-market ratio, has demonstrated superior explanatory power in capturing variations in stock returns (Fama & French, 1992, 1993).

Previous studies have consistently validated the effectiveness of FF3FM across different markets, including both developed and emerging economies (Dewi & Suartana, 2018; Hidayat et al., 2023; Hossain, 2024; Li & Duan, 2021; Shaharuddin et al., 2017). However, empirical evidence on ESG-based indices—particularly in the Indonesian context—remains limited. Moreover, studies integrating ESG-based investment frameworks with classical asset pricing models are still relatively scarce.

Therefore, this study aims to examine the excess returns of SRI-KEHATI Index stocks using the Fama-French Three-Factor Model. By focusing on an ESG-based index within an emerging market context, this research contributes to the literature by providing empirical evidence on the relevance of classical asset pricing factors in sustainable investment frameworks.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Socially Responsible Investment (SRI) and ESG

Socially Responsible Investment (SRI) has evolved from a niche approach into a more widely adopted investment strategy, driven by increasing awareness of environmental, social, and governance (ESG) issues. ESG considerations are no longer viewed solely as ethical preferences but have become an integral part of risk assessment and long-term value creation (BinMahfouz & Kabir Hassan, 2013; Revelli, 2017).

In practice, ESG integration allows investors to evaluate firms beyond financial indicators by incorporating sustainability and non-financial risks into decision-making. Prior studies show that ESG-related risks influence stock performance and investor behavior, while also contributing to portfolio diversification and improved risk management (Cornell, 2021; Dai, 2021; Jin, 2022; Xiong, 2021). However, empirical evidence also suggests that ESG labeling does not always reflect superior sustainability performance, indicating potential inconsistencies between ESG claims and actual firm behavior (Qoyum et al., 2022).

SRI-KEHATI Index

The SRI-KEHATI Index represents one of the main ESG-based investment benchmarks in Indonesia, consisting of firms selected based on both financial performance and sustainability criteria. The index applies a structured screening process that includes financial viability, sector exclusion, environmental responsibility, social impact, and corporate governance evaluation (KEHATI, 2025).

Table 2 presents the selection criteria of the SRI-KEHATI Index, reflecting a systematic and rigorous approach to constructing a sustainable investment universe. These criteria ensure that selected firms meet both financial and ESG standards, making the index a reliable benchmark for ESG-based portfolio analysis.

From a portfolio perspective, the SRI-KEHATI Index provides a clear and investable framework for constructing diversified portfolios that balance risk and return while incorporating sustainability considerations. However, ESG-based indices may exhibit different return characteristics compared to conventional benchmarks, particularly due to screening effects that alter the composition of assets (Qoyum et al., 2021).

Asset Pricing Models

Asset pricing models are essential tools for explaining the relationship between risk and return. The Capital Asset Pricing Model (CAPM) provides a foundational framework but is limited by its reliance on a single risk factor. To address this limitation, the Fama-French Three-Factor Model (FF3FM) introduces two additional factors—size (SMB) and book-to-market (HML)—to better capture variations in stock returns (Fama & French, 1992, 1993; Li & Duan, 2021).

Table 2. SRI-KEHATI Stock Selection Criteria

No.	Criteria	Information
1.	Financial Aspects	Market capitalization and total assets \geq IDR 1 trillion. Free Float Ratio \geq 10%. Positive Price Earnings Ratio (PER) over the last 6 months. Adequate liquidity (sufficient trading volume). Listed on IDX for at least 1 year.
2.	Business Aspects	Companies must not operate in prohibited sectors such as nuclear, weapons, pesticides, alcohol, tobacco, gambling, pornography, Genetically Modified Organisms (GMOs), and coal mining.
3.	Fundamental ESG Aspects	Corporate governance Environmental performance Community engagement Business conduct Human rights Labour practices & decent work
4.	Selection & Evaluation Process	Assessment through secondary data, sustainability reports, questionnaires, and external evaluations. Selection of the top 25 companies that pass initial screening. Index review and rebalancing semi-annually (May and November).
5.	Index Objective	To serve as a benchmark for sustainable investment by integrating financial performance with social and environmental responsibility.

Source: Data Processed, 2025.

Empirical studies confirm that market risk premium, size, and book-to-market factors significantly influence excess returns, although results may vary depending on market conditions and portfolio characteristics (Hossain, 2024; Setiawan & Dewi, 2021; Shaharuddin et al., 2017). In emerging markets such as Indonesia, FF3FM has shown strong explanatory power in various contexts (Amanda & Husodo, 2014; Ekaputra & Sutrisno, 2020).

However, within ESG-based investment frameworks, the applicability of traditional asset pricing models remains underexplored. ESG screening may alter risk-return structures, potentially affecting how conventional factors behave in explaining returns (Qoyum et al., 2021, 2022). Therefore, this study develops a conceptual framework that examines whether the FF3FM remains relevant in explaining excess returns within an ESG-screened investment universe, represented by the SRI-KEHATI Index.

Conceptual Framework

The conceptual framework of this study proposes that portfolio excess return is influenced by three key factors—market risk premium, size (SMB), and book-to-market (HML)—within the context of ESG-based investment. ESG, represented by the SRI-KEHATI Index, functions as a screening mechanism that shapes the investment universe rather than acting as a direct independent variable.

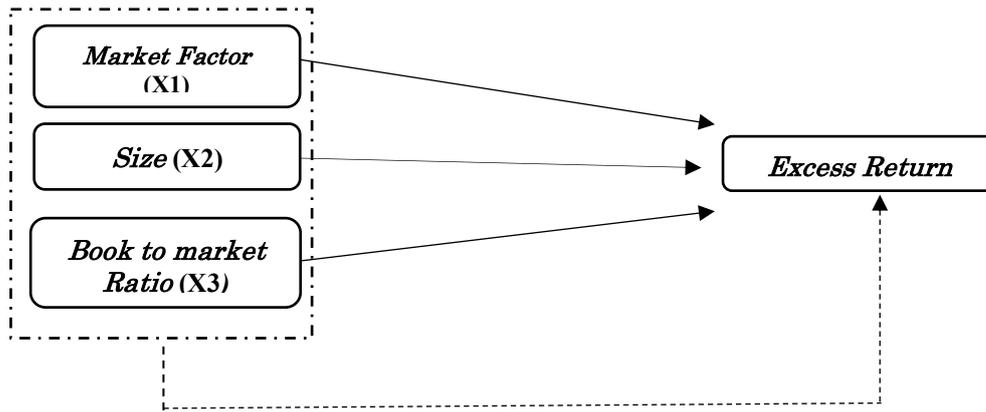


Figure 2. Theoretical Framework

Hypothesis Development

Based on the conceptual framework, the hypotheses of this study are formulated as follows:

H1: Market factor has a positive effect on portfolio excess returns.

H2: Size (SMB) has a positive effect on portfolio excess returns.

H3: Book-to-market (HML) has a positive effect on portfolio excess returns.

RESEARCH METHOD

This explanatory quantitative study examines factors estimating stock returns using the Fama-French Three Factor Model on companies in the SRI-KEHATI Index from May 2020 to November 2024. The sample consists of 10 companies selected through purposive sampling based on consistent index inclusion, data availability, and completeness of financial reports. The analysis utilizes secondary data obtained from financial platforms and official reports. Portfolio excess returns were analyzed using OLS regression in STATA17.

For panel data estimation, three common approaches exist—Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). In this study, the Common Effect Model was selected and applied for all regressions, as it assumes homogeneous intercepts and slopes across all cross-section units and time periods, making it suitable for the pooled dataset used in this analysis.

Table 3. Variable Operational Definitions

No.	Variable	Formulation	Scale
1.	Excess Return (Y)	$R_s = R_{it} - R_{ft}$	Ratio
2.	Market Factor (X1)	$MKT = R_{mt} - R_{ft}$	Ratio
3.	Size (X2)	$SMB = \frac{\left(\frac{S}{L} + \frac{S}{M} + \frac{S}{H}\right)}{3} - \left(\frac{B}{L} + \frac{B}{M} + \frac{B}{H}\right)$	Ratio
4.	Book-to-market (X3)	$HML = \frac{\left(\frac{S}{H} + \frac{B}{H}\right)}{2} - \left(\frac{S}{L} + \frac{B}{L}\right)$	Ratio

Source: Data processed, 2025.

This specification allows the model to capture systematic risk, firm size, and value effects in explaining stock returns within an ESG-oriented investment universe.

RESULTS AND DISCUSSION

Descriptive Analysis

Table 4 presents the descriptive statistics for the dependent and independent variables based on 720 observations. The excess return variable has a mean of -0.0008897, a minimum of -0.1674658, a maximum of 0.1127861, and a standard deviation of 0.0467162. The market risk premium variable shows a mean of 0.0016358, a minimum of -0.1111495, a maximum of 0.1131693, and a standard deviation of 0.0393087. Meanwhile, the size variable, measured by SMB, has a mean of 0.0003005, a minimum of -0.5906377, a maximum of 0.3755976, and a standard deviation of 0.1330394.

Table 4. Descriptive Statistical Test

	Excess Return	Market Factor	Size	Book-to-market
Mean	-.0008897	.0016358	.0003005	.0114485
Std. Dev.	.0467162	.0393087	.1330394	.1712196
Minimum	-.1674658	-.1111495	-.5906377	-.8192229
Maximum	.1127861	.1131693	.3755976	.391209
Obs.	720	720	720	720

Source: Data processed, 2025.

Model Selection Test

Chow Test

Table 5. Individual Effect F Test

Test F	value	<i>p</i> -value
<i>F</i> test that all $u_i = 0$	$F(9, 707) = 0,00$	1.0000

Source: Data processed, 2025.

The result shows that the F-statistic is not significant ($p > 0.05$), indicating that the null hypothesis cannot be rejected. This implies that there are no significant individual (cross-section) effects, and therefore, the Common Effect Model (CEM) is preferred over the Fixed Effect Model (FEM).

The Breusch-Pagan Lagrange Multiplier (LM) Test

Table 6. Breusch-Pagan LM Test

Var.	e	u	Chibar2(01)	Prob>chibar2
0.0021824	0.000481	0	0.00	1.0000

Source: Data processed, 2025.

The LM test result is also not significant ($p > 0.05$), indicating that random effects are not present in the model. Therefore, the Random Effect Model (REM) is not preferred over the Common Effect Model (CEM).

Based on these results, both the Chow test and LM test consistently suggest that the Common Effect Model (CEM) is the most appropriate model for this study.

Classical Assumption Test

Multicollinearity Test

The multicollinearity test showed low correlations among variables, with all VIF values below 5 and an average of 1.72, indicating no multicollinearity issues and ensuring reliable regression results for the Common Effect Model.

Table 7. Multicollinearity Test

Variable	VIF
Market Factor	1.54
Size	2.08
Book-to-market	1.53
Mean VIF	1.72

Source: Data processed, 2025.

Heteroscedasticity Test

The Breusch-Pagan test detected heteroskedasticity ($\chi^2 = 42.51$, $p < 0.05$), indicating non-constant residual variance that can bias estimates. To address this, robust standard errors (White robust) were used to ensure valid and efficient coefficient estimates without data transformation.

Table 8. Heteroscedasticity Test

	Value
<i>Chi-Square</i>	42.51
<i>Prob > Chi2</i>	0.0000

Source: Data processed, 2025.

Hypothesis Test Results

Table 9. Three-Factor Model Regression Results

Variable	Coefisient	Std. Error (Robust)	t-Statistics	p-value
Market Factor	0,29799	0,02601	11,46	0,000
Size	0,15848	0,01187	13,35	0,000
Book-to-Market	0,09862	0,00942	10,47	0,000
Constanta	-0,00255	0,00085	-2,99	0,003
F(3,716)	= 470,11 ($p < 0,001$)			
R-Squared	= 0,7833			
Root MSE	=0,02179			

Source: Data processed, 2025.

Based on the multiple linear regression results using the OLS method in Stata17, as presented in Table 9, the regression equation model is obtained as follows:

$$R_{pt} - R_{ft} = -0,00255 + 0,29799MRP + 0,15848SMB + 0,09862HML + e_{pt}$$

The regression shows that with stable risk factors, the SRI-KEHATI portfolio yields a negative excess return of 0.255% monthly, suggesting other risks beyond the FF3FM model. A 1% rise in market factor increases excess return by 0.298%, while small-cap stocks add 0.158%, and high book-to-market stocks add 0.099% compared to their counterparts.

Coefficient of Determination Test (R²)

The R² value (table 9) of 0.7833 indicates that 78.33% of the variation in excess returns is explained by the model's factors, demonstrating a strong fit and an effective analysis of the relationship between the variables.

Simultaneous Test (F)

The F-test (Table 9) assesses the simultaneous effect of the Fama-French factors (market factor, size, and book-to-market) on excess return. With an F-statistic of 470.11 and a p-value of 0.0000 (below 0.05), the test confirms that these factors jointly have a significant impact on excess return. This indicates that the regression model is valid and effectively explains the variation in excess return.

t-test statistics

The t-test evaluates the partial effect of each independent variable on the dependent variable, with significance indicated by a p-value less than 0.05. Table 9 shows that market factor, size, and book-to-market all have positive and significant effects on excess return, with t-values of 11.46, 13.35, and 10.47, and p-values of 0.000. Specifically, a one-unit increase in market risk premium raises excess return by 0.29799, size increases it by 0.15848, and book-to-market by 0.09862 units.

The empirical findings demonstrate that the Fama-French Three-Factor Model provides strong explanatory power in analyzing excess returns of the SRI-KEHATI portfolio, as reflected by an R² value of 0.7833. This indicates that 78.33% of the variation in excess returns can be explained by market risk premium, size, and book-to-market factors, confirming the robustness of the model in the context of ESG-based investments. The significant F-statistic (470.11; $p < 0.001$) further validates the joint explanatory capacity of these variables.

From a descriptive perspective, the negative mean excess return (-0.0008897) suggests that, on average, the SRI-KEHATI portfolio slightly underperforms the risk-free rate. This finding indicates the possibility of additional risk factors not captured by the three-factor model, such as ESG-specific

risks, macroeconomic shocks, or behavioral dynamics (Cornell, 2021; Xiong, 2021). However, the relatively moderate standard deviation (0.0467) implies that the portfolio maintains a stable risk profile, supporting the argument that ESG-based portfolios tend to offer lower volatility and more resilient performance over time (Dai, 2021).

The Influence of Market Factor on Excess Return

The regression results show that the market factor has a positive and highly significant effect on excess return ($\beta = 0.29799$; $p < 0.001$). This indicates that a 1% increase in market risk premium leads to an increase of approximately 0.298% in portfolio excess return. This finding is consistent with the theoretical foundation of the Capital Asset Pricing Model, which posits that systematic risk is the primary determinant of expected returns. It also aligns with the extended framework of Fama-French Three-Factor Model, where market premium remains the core explanatory variable (Fama & French, 1993).

Empirically, this result supports prior studies such as Amanda & Husodo (2014) and Munawaroh & Sunarsih (2020), which confirm that market risk premium significantly influences excess returns in the Indonesian capital market. From a portfolio perspective, this reinforces the principle of risk-return trade-off, where investors require higher compensation for bearing systematic risk (Bodie et al., 2018).

However, in the context of ESG-based portfolios such as SRI-KEHATI, the relatively moderate coefficient suggests that while market risk remains dominant, sustainability considerations may partially mitigate exposure to extreme market fluctuations. This implies that ESG integration does not eliminate systematic risk but may improve risk management efficiency, making portfolios more resilient during market stress.

The Influence of Size on Excess Return

The size factor (SMB) is found to have a positive and significant effect on excess return ($\beta = 0.15848$; $p < 0.001$), indicating that small-cap firms tend to generate higher excess returns compared to large-cap firms. This finding is consistent with the size anomaly documented in the Fama-French Three-Factor Model (Fama & French, 1993), which suggests that smaller firms carry higher risk and therefore offer higher expected returns.

Supporting empirical evidence from Amanda & Husodo (2014) and Azam (2023) also highlights the importance of firm size in explaining stock returns in emerging markets. In the Indonesian context, smaller firms are often associated with higher growth potential but also greater uncertainty, including liquidity constraints and operational risks. As a result, investors demand additional return as compensation.

Nevertheless, an important nuance emerges in the ESG context: not all small-cap firms qualify for inclusion in the SRI-KEHATI Index due to strict ESG screening. This implies that the observed size effect reflects not only traditional risk factors but also a subset of firms that meet sustainability criteria. Therefore, the size premium observed in this study may represent a “filtered” risk premium—where higher returns are associated with firms that are both smaller and ESG-compliant. This finding contributes to the literature by suggesting that ESG screening does not eliminate classical anomalies but rather reshapes them within a more selective investment universe.

The Influence of Book-to-Market on Excess Return

The book-to-market (HML) factor also shows a positive and statistically significant effect on excess return ($\beta = 0.09862$; $p < 0.001$), indicating that value stocks outperform growth stocks within the SRI-KEHATI portfolio. This result is consistent with the value premium theory embedded in the Fama-French Three-Factor Model, where firms with higher book-to-market ratios are considered riskier and thus provide higher returns (Fama & French, 1993).

Empirical findings from Amanda & Husodo (2014), Azam (2023), and Munawaroh & Sunarsih (2020) further confirm the positive relationship between book-to-market ratio and excess returns. From a theoretical standpoint, firms with high book-to-market ratios are often perceived as undervalued or financially distressed, leading investors to demand higher returns as compensation for additional risk (Bodie et al., 2018).

In the ESG context, this finding carries additional implications. Firms included in the SRI-KEHATI Index must pass stringent ESG criteria, which may reduce the likelihood of extreme financial distress. Therefore, the positive book-to-market effect observed in this study suggests that “value” characteristics persist even among relatively high-quality firms. This indicates that ESG screening

does not fully eliminate valuation-based return differentials but instead operates alongside traditional financial metrics in shaping portfolio performance.

CONCLUSION

This study shows that the Fama-French Three-Factor Model continues to work well in explaining portfolio excess returns, even within an ESG-based investment setting such as the SRI-KEHATI Index. The results suggest that market risk, firm size, and book-to-market characteristics still play an important role in shaping returns. In other words, incorporating ESG criteria does not replace traditional financial logic, but rather sits alongside it and helps form a more balanced investment perspective.

That said, this research is not without limitations. The analysis focuses on a relatively small sample within a single index, which means the findings should be interpreted with some caution. In addition, the model only captures three main risk factors, while other influences—such as momentum, liquidity, macroeconomic dynamics, or even ESG-specific risks—are not explicitly included. The time period used in this study may also not fully reflect longer-term structural changes in the market.

Looking ahead, future studies could expand both the data and the model. Exploring other ESG indices, longer observation periods, or extended models such as the Fama-French Five-Factor Model may provide deeper insights. It would also be valuable to directly include ESG scores or sustainability ratings to better understand how these factors interact with traditional risk drivers. By doing so, future research can offer a more complete picture of how sustainable investing performs, particularly in emerging markets.

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