Original Research

How does ESG explain excess returns in emerging market? An Asset-Pricing Approach

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Abstract

Objective: Previous studies found several important risk factors for the capital market in explaining stock performance. However, most studies only consider conventional investment factors without considering sustainable ones. This study examines Environmental, Social, and Governance (ESG) performance's effect as a risk factor in a multi-factor model.

Design/Methods/Approach: This study employs secondary data from the company's financial reports, annual reports, and Thomson Reuters ESG score data. The sample for this study were companies listed on the LQ45 index during the 2015-2019 period, which were selected using the purposive sampling method and produced a selection of 19 non-financial companies that met the criteria.

Findings: The results show that ESG negatively affects 21 out of 30 portfolios, and the four-factor ESG model is better at explaining excess returns than the three-factor Fama-French model.

Originality/Value: This study provides new insights by including ESG as a risk factor in the three-factor Fama-French model in explaining stock returns. The existence of the ESG variable allows us to identify whether sustainability is an essential determinant in explaining the average portfolio return. This study adds new insights, where using sustainability reports in the form of ESG can capture cross-sectional variations in stock returns, not only on market factors, size factors, and book-to-market factors.

Practical/Policy implication: Given the established evidence that ESG factors can mitigate risk, investors are encouraged to thoroughly evaluate a company's sustainability report to assess the efficacy of its ESG performance. For managers of companies, this serves as the foundation for developing strategies that will enhance the long-term profitability and sustainability of the organization.

Keywords: ESG, Fama-french three-factor model, Excess return, CAPM.

JEL Classification: G11, Q56

1. Introduction

Sustainability is receiving increasing attention among investors in financial markets. Sustainability reporting has become standard practice for many companies, with steady growth over the last decade. Based on a survey conducted by KPMG (2022) shows that the N100 companies continue to improve their reporting rates very well in every global study. If 64% of N100 companies reported ten years ago, then in 2022, 79% of these companies have reported. 90% or more of the G250 companies have reported sustainability for over a decade. Figure 1.1 presents a survey in the sustainability report 2022, which suggest an increasing number of companies are aware of the importance of sustainability issues. The issue of sustainability is increasingly global, with the United Nations (UN) proposing 17 sustainable development goals in 2015 through "Transforming our world: the 2030 agenda for sustainable development", which is a general guide in approaching sustainable development issues. Sustainability itself consists of three crucial aspects: environment, social, and governance, or what is often known as ESG.
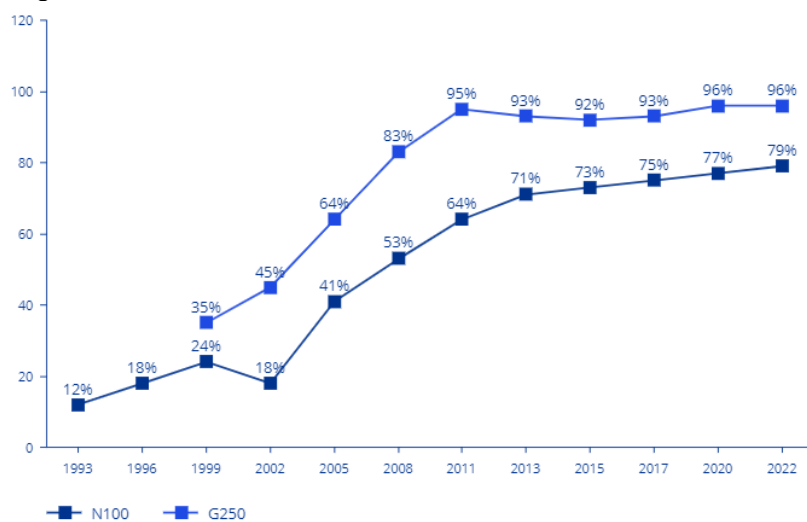
Source: KPMG Survey of Sustainability Reporting 2022, KPMG International, September 2022
Figure 1. Global sustainability reporting rates (1993–2022)

Limkriangkrai et al. (2017) explained that Environmental (E) activities involve the company's efforts to positively impact the environment through compliance with existing regulations and their future impact. Social activity (S) refers to fair treatment of stakeholders and protection of the social ecosystem in which the company operates. Governance (G) includes corporate ethics and integrity, including openness and fairness, regarding company leadership, executive remuneration, audits, internal controls, and shareholder rights. ESG is an essential aspect for investors because it can represent the opportunities and risks faced by the company, identify new opportunities and manage long-term risks to avoid poor company performance (Ernst & Young (2017). Investors use non-financial data such as ESG factors to decide whether to invest in a company (Coleman et al., 2010). The increasing role of ESG in the world of investment reflects in the emerging trend of ESG investing, namely the concept of sustainable investment.

The trend of sustainability investment tends to develop late in developing countries compared to developed countries, especially Europe. Developing countries tend to be more vulnerable to social and environmental issues. Developing countries are synonymous with a large population, so it impacts increasing the burden on resources such as water, food, and energy. These challenges can increase investment risk in developing countries, thus moving investors' returns. With these issues and challenges increasing, investors realize that companies that pay more attention to ESG factors will be better off in the long term (Scott, 2015). Companies compete to produce sustainability reports to get an ESG score high enough to attract investors. Ernst & Young (2013) in his research found the top three reasons why companies report sustainability aspects, including (1) for transparency of stakeholders, (2) to gain competitive advantage, and (3) for risk management. Risk management is one of these three reasons because a company's risk exposure affects its investment decisions and can be diversified to avoid huge losses.

Researchers explore various techniques for integrating ESG factors into investment portfolios. Some of the most popular are factor-based investment techniques, such as the Sharpe method (Sharpe, 1994) and CAPM models (Ross, 1976), which use risk factors such as beta to catch asset mispricing. In addition, the multi-factor model used widely is the factor of firm size and firm value Fama & French (1993), along with the beta value. Bender et al. (2014), Fama & French (2015), also Maiti (2021) states that risk factors and factor models are constantly evolving. There have been more than 300 risk factors that researchers and many others have identified that have not to find, but only a few can correlate significantly concerning returns. Global risk considerations are essential, but stock market-specific risk factors are not. Because risk factors are constantly evolving, it is necessary to update risk factors and the asset pricing model to discover their role in determining asset prices in the future. Many studies that propose new risk factors in forming a

model have been carried outs on stock market samples from developed countries. Although there has been much evidence regarding the effect of ESG performance on stock returns, as was done by Gunawan & Priska (2018) and Qodary & Tambun (2021), However, in Indonesia, as one of the emerging markets, there has not been much use of ESG performance as a risk factor in a multi-factor model. Therefore, it is vital to conduct a study on this topic to support the sustainability aspects designed by the company. To get the answer, we surveyed to analyze the relationship between ESG and the three Fama-French factors together. Our study reveals that the ESG model is better than the Fama-French model in explaining excess returns.

The purpose of this study is first to determine the effect of ESG performance on stock excess returns in LQ45 public companies listed on the IDX; and second, to find out that the four-factor ESG model is better in explaining excess stock returns compared to Fama-French's three-factor model. The first objective is to enrich previous research findings, which document the many events-related studies in organizations of sustainable investment that go beyond the traditional practice of shareholder wealth maximization. The second goal is to develop a more robust Fama-French three-factor model with ESG factors. The questions answered in this study are whether the company's ESG performance is also a factor influencing excess returns and whether the four-factor ESG model better explains excess stock returns compared to Fama-French's three-factor model. We estimated linear regression with the ordinary least squares estimator (OLS) to answer the first question, and we conducted a two-paired sample t-test on adjusted r-squared values to determine whether there was a significant difference in adjusted r-squared between the three-factor Fama-French model and the four-factor ESG model to answer the second question.

Our study makes several significant contributions in both theoretical and practical aspects. First, we provide additional evidence for developing an enlightened value maximization theory. The company's recruitment activities can be considered a way to understand and meet stakeholders and maximize long-term value. Second, we appeal to company management about the importance of reporting sustainability to signal to stakeholders that the company maximizes corporate value rather than profit.

The remainder of this paper organizes as follows. The following section outlines the literature review and develops the hypotheses. Section 3 details the sample, variables, and empirical models. Section 4 provides the empirical analysis and results. Section 5 outlines the conclusions and implications of the study.

2. Literature Review and Hypotheses Development

Environmental, Social, and Governance (ESG)

ESG is a subsection of corporate non-financial indicators covering ethics, sustainability, and corporate governance issues. The term in capital markets and investors who can better integrate ESG factors into their strategies have a competitive advantage increasingly used (Jin, 2018). Boffo & Patalano (2020) defines ESG investing as an investment approach that incorporates environmental, social, and governance factors and financial factors in making fund allocation and risk decisions to generate sustainable long-term financial returns. Bennani et al. (2019) explained that there are generally two reasons for investing in ESG. First, these investments may be motivated by ethical values that impact the economy. For example, investors may want to promote gender equality, reduce carbon footprints, or avoid funding for antipersonnel mines and chemical weapons. Second, it can be motivated by the need to manage and mitigate long-term risks. The latter can be operational, reputational, but also regulatory and financial.

According to a survey by Ernst & Young (2017), some investors still do not consider non-financial information in making investment decisions because there are few non-financial measurements of companies that can compare with other companies. For this reason, an ESG rating by an independent institution is critical because it is a source of ESG information for companies to consider in investment decisions. ESG rating agencies include Morgan Stanley Capital International (MSCI), Standard & Poor's, KLS Research & Analytics, Morning Star, Thomson Reuters, and many more. One of the most comprehensive and widely used ESG research worldwide – including in this study – is ESG Research from Thomson Reuters.

Capital Asset Pricing Model

Sharpe (1964) and Lintner (1965) developed the Capital Asset Pricing Model (CAPM), which builds on the work of Markowitz (1952), who created the "mean-variance model." The CAPM model proposes a positive linear relationship between the expected risk of an asset and the expected rate of return. The only related measure of risk is systematic risk, measured via beta. The expected return on risky assets is estimated to be positively associated with beta, where beta predicts how the rate of return on the stock or portfolio will move relative to the movement of the market portfolio (Abd-Alla & Sobh, 2020; Sutrisno & Nasri, 2018). In the CAPM model, the market portfolio is very influential because it assumes that the relevant risk is systematic as measured by beta (the level of sensitivity of security returns to changes in market returns). The purpose of the CAPM formula is to evaluate the fair value of a stock compared to the risk and time value of money calculated by the risk-free rate, provide a prediction between the risk of an asset and the expected return, and as a basis for determining the group of stocks selected for investment.

Fama-French Three-Factor Model

Basu (1977) tested the idea that value-based variables might explain the CAPM model anomaly for the first time and found a significant positive correlation between the earnings/price ratio and average return. Furthermore, Banz (1981) obtained the result that the coefficient of the size variable can explain the cross-section better than the beta coefficient, where small companies provide a higher rate of abnormal returns than large companies. Reinganum (1981) found that firm size (size) is an essential factor. Stattman (1980) and Rosenberg et al. (1985) found that the ratio of the company's book value, BE (Book Equity), to its market value, ME (Market Equity), is positively related to the average return on US stocks. So it is with inventions Chan et al. (1991) that BE/ME also has a vital role in explaining cross-section returns in the Japanese market. Fama & French (1992) found that apart from the beta factor, size and book-to-market variables also explained the return cross-section on the New York Stock Exchange (NYSE) in 1963-1990. The firm size variable is adversely associated with returns, with small-capitalized company shares outperforming large-capitalized company shares. Meanwhile, the book-to-market variable is associated favorably, with a high book-to-market ratio indicating that a company is cheap and has the potential to yield a more significant return.

In 1993, Fama and French formed a three-factor model using the company's fundamental factors: size and book-to-market. Fama & French (1993) introduces a three-factor model that expands the CAPM by adding a size factor (SMB) and a valuation-related factor, namely book-to-market equity (HML). SMB is a measure of corporate risk, where the shares of small companies expect to be more sensitive. On the other hand, HML represents a higher risk exposure for companies with a high book value-to-market ratio (value stocks) and lower for stocks of companies with a low book-to-market ratio (growth stocks). Fama & French (1992) have concluded that the size and ratio of book-to-market equity are the variables that have the most significant relationship with returns and can explain the cross-section of average stock returns well.

Relationship between ESG Score and Stock Return

Environmental performance is the company's efforts related to the environment, which can cover environmental impact issues originating from the resources used and company activities, complying with environmental regulations, product repair and operation, and environmental preservation (Widhiastuti et al., 2017). Several previous studies examining the effect of environmental performance on stock returns have found a positive correlation (e.g., Nurvania & Azib, 2021; Purwaningsih, 2017; Wiweko & Friscila, 2021). A company's CSR disclosure to the public can be additional information for investors' investment decisions and influence the company's stock return. CSR disclosure will increase a stock's return because it increases investor interest, especially investors who pay attention to non-financial aspects of investing, as in research conducted by Putra & Utama (2015). Different results find that CSR activities harm stock returns, which can cause by the significant costs incurred by the company for these activities (e.g., Pratiwi & I.Kt.Suryanawa, 2014). Good Corporate Governance (GCG) is a form of management within the company that guarantees and protects the rights of the company's stakeholders will form so in a healthy and professional work environment (Elisetiawati & Artinah, 2016). Several researchers found a positive and significant effect of GCG on abnormal returns (e.g., Budiharjo, 2016; Syafrullah & Muharam, 2017). On the other hand, there are differences in results that do not find the effect of GCG on stock returns and find that GCG has not been able to attract investors' attention and therefore has no impact on stock performance. (eg. Johnson et al., 2008; Pratiwi & I. Kt. Suryanawa, 2014).

Boffo & Patalano (2020) stated that the 2008 financial crisis had shown portfolio diversification by investing in different asset classes to prove less effective than investors had anticipated, as previously uncorrelated asset classes began to move together. As a result, factor investing has emerged as an alternative to traditional asset class allocations to generate risk-adjusted returns. Risk factor-based investment allocation is done by determining the underlying risk exposure that contributes to the return of each asset and then selecting assets based on that exposure. By understanding the underlying risk factors in various asset classes, investors can choose which asset class allows them to gain exposure to certain risk factors most efficiently. Bennani et al. (2019) found that researching ESG investing and its impact on the stock market found that investing based on ESG factors did not have an impact on stock returns in the 2010-2013 period but had a significant effect in the 2014-2017 period. This shows that there has been a shift in the trend of innovation which ultimately also impacts stock returns, so the effect of ESG on returns is interesting to study. Jensen (2002) carries the theory of enlightened value maximization, which combines elements of shareholder theory and stakeholder theory, in which companies can maximize the company's long-term value while simultaneously trying to fulfill stakeholders' interests. When linked to the company's ESG performance, the company's sustainability efforts are one of the company's efforts to understand and fulfill stakeholders and maximize corporate value in the long term.
H1: ESG performance affects the stock portfolio's excess return significantly.

Comparison of the ESG and Fama French Models

A multi-factor asset pricing variable constantly changes (Fama & French, 2015). In their research, Bender et al. (2014) found that the risk premium affected alpha in equity investments and emphasized that no single risk premium can remain constant over time. The results of this study indicate that there is still the possibility of an additional risk premium beyond the currently set risk premium. In its development, several types of Fama-French models have emerged, such as

the Fama-French four-factor model proposed by Carhart (1997), the five-factor model developed by Fama & French (2015), the Fama-French six-factor model by Roy & Shijin (2018), and many other risk factors. Wu et al. (2016) stated that most of the risk premium causes by investor sentiment. Increasing trends in ESG and ESG Investing can make investors consider these factors more. Maiti (2021) stated that there is a tendency for investors who wish to invest longer to view the risk premium of other confirmed risk factors, such as company size and value, along with ESG factors.

Pollard et al. (2018) state that the ESG factor can provide insight into a company's financial performance. Besides that, it finds the significance of integrating ESG factors as a risk premium factor. Bennani et al. (2019) investigated whether ESG could be a risk factor, performed a single-factor model estimate using a cross-section methodology, and performed a stock return regression on each factor. The study results show that since 2014 the ESG factor has become a factor that can compete with market risk factors. In addition, the ESG factor was able to explain cross-sectional returns better than other risk factors in both North America and the Euro Zone during the 2014 – 2017 period. The ESG factor was statistically significant in the six-factor Fama-French model (five-factor model plus the ESG factor) on European stock exchanges but not significant in North America, so there are differences in the influence of the ESG factor in each country. This difference causes by the behavior of investors in investing.

H2: The four-factor ESG model is better than Fama-French's three-factor model in explaining excess return on stock portfolios.

3. Method

3.1. Data and sample

The initial sample consists of all companies in the LQ45 index listed in the Indonesia Stock Exchange (IDX) in 2015–2019. The LQ45 index includes liquid companies with solid fundamentals. It is one of investors' go-to indexes. Data sources for this study include company annual reports, Bank Indonesia databases, yahoo finance databases, and the Thomson Reuters website. Financial data from the database of Bank Indonesia and yahoo finance obtain. The company's ESG score is from the Thomson Reuters website. The Thomson Reuters ESG Scores are a series of assessments designed to measure a company's relative ESG performance and effectiveness across ten critical themes based on publicly reported data. Aggregating data sets and applying the following sample selection criteria. First, exclude all companies from the financial industry because of discrepancies in their financial statements. Second, included in the LQ45 index for five consecutive years from 2015-2019. Third, it does not have a negative equity value. After applying the sample selection criteria, the final sample includes 19 companies with 30 portfolios and 60-time series data used. See Table 1 for sample selection.

Table 1. Sample Selection

Description	
Number of companies included in the LQ45 Index stock group	45
Not listed consistently in the LQ45 Index stock group on the Indonesia Stock Exchange during the 2015-2019 period	-19
Issuers listed in the LQ45 Index stock group on the Indonesia Stock Exchange during the 2015-2019 period	28
The available data is incomplete	-5
Financial Sector	-4
Total	19

3.2. Variable definitions

The dependent variable in this study uses the excess return obtained from the difference between the return on securities or portfolio i in period t and the risk-free rate in period t. Where to find the company's stock return, then use the following formula:

$$R_{it} = \frac{P_{it} - P_{it-1}}{P_{it-1}} \quad \text{.. (1)}$$

where:

R_{it} : the actual stock return of company i in period t
P_{it} : closing price of company stock i period t
P_{it-1} : closing price of company stock i period t-1

The independent variable is ESG performance, where our approach to evaluating the role of ESG builts on the classic Fama-France three-factor model (Fama & French, 1992), which assigns market, size, and value factors to describe

the average return. These set factors do not remain constant over time, and there are additional factors (Bender et al., 2014; Fama & French, 2015; Pástor, Ľ., & Stambaugh, 2003). The three-factor model can describe in the following equation:

$$R_{it} - R_{ft} = \alpha + \beta_t (R_{mt} - R_{ft}) + (SMB)_t + (HML)_t + \varepsilon_t \quad \text{....................(2)}$$

where:
R_{it} : realized stock return i period t
R_{ft} : risk-free asset return period t
R_{mt} : return market period t
α : Constanta
β : the sensitivity of stock i to each factor
$(SMB)_t$: return small firm minus the big firm
$(HML)_t$: return high book-to-market Equity minus low-book-to-market Equity
ε : error

Where the calculation of return for each asset pricing factor is determined using the value-weighted method. The explanation of each factor describes as follows:
1. Market Factor ($R_{mt} - R_{ft}$)
    The market factor represents the difference in each market's return on the risk-free interest rate (Sutrisno & Nasri, 2018).
2. Size factor (SMB)
    Size premium, also known as Small minus big (SMB), is a proxy for firm size based on the stock portfolio returns of large and small companies. The formation of SMB portfolio is formed by dividing companies based on market capitalization value into small (S) and big (B) categories and dividing companies based on book-to-market equity values into high (H), neutral (N), and low (L) categories, where the high group consists of the top 30% of companies, the low group includes the bottom 30% of companies, and the other 40% classify as neutral groups. The following is the SMB calculation formula:
    $$SMB = \frac{(SH + SN + SL) - (BL + BN + BH)}{3} \quad \text{....................(3)}$$
    where:
    SMB : small company portfolio returns minus return from big company portfolio (portfolio is formed based on size – book to market)
    SH : small-high company portfolio returns
    SN : small-neutral company portfolio returns
    SL : small-low company portfolio return
    BL : big-low company portfolio returns
    BN : big-neutral company portfolio returns
    BH : big-high company portfolio returns
3. Book-to-market factor (HML)
    The HML portfolio is the weighted average difference between the high BE/ME portfolio returns (small-high and big-high) and the low BE/ME portfolio returns (small-low and big-low). This focuses on the differences in return behavior of companies with high and low BE/ME. The HML factor reveals that value stocks (high book-to-market ratio) generate higher returns than growth stocks (low book-to-market ratio). The following formula can calculate HML:
    $$HML = \frac{(SH + BH) - (SL + BL)}{2} \quad \text{....................(4)}$$
    where:
    HML : Return of the portfolio of companies with high Book to Market Equity reduced by low Book Market Equity.
    SL : Return of small (S) companies with a Low Book to Market (L).
    SH : Return portfolio of companies with small (S) and high book to market (H).
    BL : Big company portfolio return (B) and has a Low Book to Market (L).
    BH : Big company portfolio return (B) and has a Low Book to Market (L).

The Fama-French three-factor regression model proves ESG's effect in this investigation. The ESG HML variable in this study will calculate through the following equation:
$$HML\ ESG = \frac{(SH + BH) - (SL + BL)}{2} \quad \text{....................(5)}$$
Description:
HML : Returns from a portfolio based on companies with high ESG scores minus low ESG scores.
SL : Return of companies with small (S) and low ESG Scores (L).

SH   : Return of companies with small (S) and high ESG Scores (H).
BL   : Portfolio of companies with big (B) and low ESG Scores (L).
BH   : Company portfolio with big (B) and has a High ESG Scores (H)

3.3. Methodology

This study used the OLS method with the common effect model to perform regression. Descriptive statistical analysis, classical assumption testing, coefficient of determination, F test, and hypothesis testing uses. Classical assumption testing consists of normality, multicollinearity, and heteroscedasticity tests. Panel data and the standard effect model do not require the autocorrelation test. This study uses the equation model:

$$R_i - R_f = \alpha + \beta\left(R_m - R_f\right) + \beta SMB + \beta HML_{bme} + \beta HML_{esg} + \epsilon \dots\dots\dots\dots\dots\dots(6)$$

Where:
R_i : realized stock return i period t
R_f : risk-free asset return period t
R_m : market return period t
α : Constanta
β : the sensitivity of stock i to each factor
SMB   : return small firm minus the big firm
HML   : return high book-to-market Equity minus low-book-to-market Equity
HML_{ESG} : return high score ESG equity minus low score ESG equity
ϵ : error

4.   Result and Discussion

4.1. Descriptive Statistics

Table 2 presents the observations from the 30 portfolios and 60-time series data. The MKT variable results from market returns minus the risk-free rate, which has a minimum value of 0.703, a maximum value of -0.286, an average of -0.477, and a standard deviation of 0.105. The SMB variable is the result of calculating the returns of small companies minus the returns of large companies with a minimum value of -0.257 and a maximum value of 0.419 with an average of 0.015 and a standard deviation of 0.146. The positive mean value of the SMB variable indicates that small companies tend to outperform large companies. The HML BME variable is the result of calculating the returns of companies that have high Book Market Equity minus the returns of companies that have low Book Market Equity, which has a minimum value of -0.368 and a maximum value of 0.715, an average of 0.037 and a standard deviation of 0.194. The positive mean value of the HML variable indicates that companies with high BME ratios tend to outperform companies with low BME ratios. The HML ESG variable is the result of calculating company returns that have a high ESG score minus company returns that have a low ESG score with a minimum value of -0.421 and a maximum value of 0.279 with an average of -0.006 and a standard deviation of 0.171.

Table 2. Descriptive Statistics Independent Variable

Variables	Indicator	N	Min	Max	Mean	Std. Deviation
ESG Performance	MKT	60	-0.703	-0.286	-0.477	0.105
Leverage	SMB	60	-0.257	0.419	0.015	0.146
Good Corporate Governance	HML	60	-0.368	0.715	0.037	0.194
Age	HML_ESG	60	-0.421	0.279	-0.006	0.171

Table 3 shows the mean excess return portfolio formed based on MC, BME, ESG, E, S, and G. In the market capitalization group, we can see that small companies (P5) generate greater returns than large companies (P1). This is known as the size effect. These results are in line with research by Fama & French (1993, 2015), Roy & Shijin (2018), and Maiti (2021). Small company portfolios will beat large ones over time. In the BME (book-to-market equity/ratio) category portfolio, P1 companies outperform P5 companies. In the ESG category portfolio, there is no return difference between companies with high and low ESG performance. In the ENV (environment) category portfolio, companies with high ENV performance outperform companies with low ENV performance. In the SOS (social) and GOV (governance) portfolios, portfolios of companies with low SOS and GOV performance outperformed those with high SOS and GOV performance.

Table 3. Descriptive Statistics Dependent Variable

Variables	Indicator	P1	P2	P3	P4	P5
Market Capitalization	MC	-0.476	-0.488	-0.455	-0.479	-0.418
Book-to-Market Equity/ratio	BME	-0.420	-0.479	-0.498	-0.487	-0.486
ESG	ESG	-0.473	-0.464	-0.485	-0.450	-0.474
Environment	ENV	-0.451	-0.489	-0.445	-0.471	-0.493
Social	SOS	-0.469	-0.474	-0.476	-0.479	-0.452
Governance	GOV	-0.488	-0.515	-0.448	-0.465	-0.449

4.2. Effect of ESG performance on excess return portfolio

Based on the results of the F test listed in Tables 4 and 5, the probability value (sig) is 0.000. Since sig <significant value (α) is 0.05, all independent variables affect the dependent variable in this study. The partial test results showed that the market risk premium variable boosts the portfolio's excess return. Besides that, the SMB variable (size premium) has different results, namely: in model 1 (Fama-French three-factor model), the SMB variable has a significant positive effect on 10 portfolios, a significant negative on 2 portfolios, while the rest is not significant. In model 2 (ESG four-factor model), the SMB variable has a significant positive effect on 11 portfolios, and a significant negative effect on 3 portfolios, while the rest is insignificant. The same thing also happened to the BME HML variable (market value premium), which had different results, namely: in model 1 (Fama-French three-factor model), the BME HML variable had a significant positive effect on 12 portfolios, a significant negative on 4 portfolios, while the rest were not significant. Whereas in model 2 (ESG four-factor model), the HML BME variable has a significant positive effect on 19 portfolios, while the rest are not significant. Furthermore, the ESG HML variable (ESG Score premium) has a significant negative effect on 21 portfolios, while the rest are not significant.

Table 4. Hypothesis Testing Results in Fama-French Regression Mode

			T-Test						F-Test
		C	MKT		SMB		HML		
			B	Sig	B	Sig	B	Sig	Sig
Size	P1	0.108	1.219**	0.000	-0.194	0.316	0.000	0.999	0.000
	P2	0.226	1.516**	0.000	0.583**	0.006	0.448**	0.006	0.000
	P3	0.109	1.219**	0.000	0.174	0.486	0.38**	0.049	0.000
	P4	0.265	1.589**	0.000	1.155**	0.000	-0.094	0.641	0.000
	P5	0.098	1.196**	0.001	0.237	0.524	1.336**	0.000	0.000
BME	P1	0.100	1.193**	0.000	0.519**	0.008	1.1**	0.000	0.000
	P2	0.020	1.082**	0.000	0.483*	0.079	0.249	0.229	0.000
	P3	0.210	1.513**	0.000	-0.143	0.582	0.418**	0.037	0.000
	P4	0.149	1.314**	0.000	0.068	0.766	-0.284*	0.108	0.000
	P5	0.043	1.104**	0.000	0.294**	0.040	-0.198*	0.068	0.000
ESG	P1	0.124	1.455**	0.000	0.602	0.602	0.975**	0.000	0.000
	P2	0.216	1.448**	0.000	-0.412*	0.093	0.43**	0.023	0.000
	P3	0.233	1.528**	0.000	0.204	0.487	0.191	0.391	0.000
	P4	0.058	1.086**	0.000	0.094	0.687	0.207	0.243	0.000
	P5	-0.029	0.939**	0.000	0.925**	0.001	-0.332**	0.088	0.000
ENV	P1	0.163	1.353**	0.000	0.397	0.138	0.654**	0.002	0.000
	P2	0.199	1.502**	0.000	-0.554**	0.016	0.975**	0.000	0.000
	P3	0.232	1.448**	0.000	-0.385	0.143	0.517**	0.011	0.000
	P4	0.027	1.039**	0.000	0.451*	0.065	-0.267	0.148	0.000
	P5	0.028	1.097**	0.000	1.004**	0.000	-0.363*	0.065	0.000
SOS	P1	0.217	1.526**	0.000	-0.048	0.863	1.118**	0.000	0.000

| | | C | MKT | | SMB | | HML | | F-Test |
			B	Sig	B	Sig	B	Sig	Sig
	P2	0.198	1.413**	0.000	-0.154	0.503	0.120	0.494	0.000
	P3	0.126	1.291**	0.000	0.209	0.463	0.260	0.232	0.000
	P4	0.125	1.27**	0.000	0.162	0.502	-0.028	0.878	0.000
	P5	-0.019	0.933**	0.000	0.767**	0.004	0.015	0.940	0.000
GOV	P1	0.223	1.589**	0.000	-0.067	0.791	1.254**	0.000	0.000
	P2	0.086	1.269**	0.000	-0.154	0.613	0.171	0.459	0.000
	P3	0.155	1.276**	0.000	0.033	0.889	0.119	0.508	0.000
	P4	0.115	1.237**	0.000	0.320	0.114	0.112	0.462	0.000
	P5	-0.027	0.903**	0.001	0.673**	0.012	-0.038	0.848	0.000
Significant Positive			30		10		12		
Significant Negative			-		2		4		
Not significant			-		18		14		

Notes: *sig. 5%, **sig. 10%

The t-test showed that the HML ESG variable significantly negatively affected 21 of 30 existing portfolios. This could indicate that companies on the LQ45 index with low ESG scores outperformed those with high ESG scores in 2015-2019. The observed correlation between ESG factors and the performance of 21 portfolios suggests that companies with higher ESG scores tend to exhibit reduced risk, as evidenced by the beta coefficient in the regression analysis. Companies that carry out sustainability efforts can mitigate their risks. Meanwhile, companies with low ESG performance have higher risks, so investors require higher returns. The corporation may have understood the benefits of ESG activities or the opportunity costs of not doing so. In line with the enlightened value maximization theory initiated by Jensen (2002), companies can maximize long-term value through efforts made for stakeholders. The regression results also show that ESG has no significant effect on the 9 portfolios. This could be due to the slow adoption of ESG on the Indonesian stock exchange and also differences in investor behavior in emerging markets (Bennani et al., 2019) who still see ESG as an additional cost, so there are investors who see ESG as a factor that increases returns, and there are also investors who see ESG as a factor that can have a negative impact on returns so that in the end the results obtained are not significant. In general, it is known that the ESG variable affects stock returns in most portfolios.

Table 5. Hypothesis Testing Results in ESG Model Regression

| | | C | MKT | | SMB | | HML | | HML ESG | | F-Test |
			B	Sig	B	Sig	B	Sig	B	Sig	Sig
Size	P1	0.24	1.485**	0.000	-0.21	0.3	0.053	0.692	-0.236**	0.028	0.000
	P2	0.105	1.22**	0.000	-0.593**	0.008	0.308**	0.029	-0.214*	0.053	0.000
	P3	0.03	1.033**	0.007	0.134	0.609	0.734**	0.001	-0.324**	0.06	0.000
	P4	0.136	1.336**	0.000	1.212**	0.000	0.198	0.322	-0.277*	0.082	0.000
	P5	0.122	1.253**	0.001	0.168	0.665	0.832**	0.000	-0.392**	0.018	0.000
BME	P1	0.076	1.131**	0.000	0.443**	0.025	1.036**	0.000	0.126	0.359	0.000
	P2	0.091	1.223**	0.000	0.529*	0.065	0.945**	0.000	-0.633**	0	0.000
	P3	0.214	1.425**	0.000	-0.176	0.516	0.14	0.402	-0.318**	0.019	0.000
	P4	0.117	1.267**	0.001	0.033	0.892	0.135	0.533	-0.261	0.13	0.000
	P5	0.134	1.281**	0.000	0.245*	0.096	-0.13	0.445	-0.358**	0.01	0.000
ESG	P1	0.159	1.366**	0.000	0.414**	0.059	0.695**	0.002	0.116	0.478	0.000
	P2	0.106	1.167**	0.000	-0.377	0.141	0.209	0.204	0.134	0.301	0.000
	P3	0.215	1.485**	0.000	0.12	0.692	0.424**	0.044	-0.408	0.015	0.000
	P4	0.039	1.118**	0.000	-0.026	0.914	0.251	0.132	-0.401**	0.003	0.000
	P5	0.113	1.19**	0.001	0.611**	0.005	0.546**	0.01	-0.885**	0	0.000
ENV	P1	0.192	1.389**	0.000	0.684**	0.005	0.706**	0.000	-0.329**	0.019	0.000
	P2	0.083	1.203**	0.001	-0.502**	0.035	0.382**	0.052	-0.093	0.54	0.000
	P3	0.197	1.36**	0.000	-0.495*	0.067	0.731**	0.000	-0.345**	0.011	0.000
	P4	0	1.017**	0.000	0.315	0.197	0.106	0.474	-0.458**	0	0.000

		C	MKT		SMB		HML		HML ESG		F-Test
						T-Test					
			B	Sig	B	Sig	B	Sig	B	Sig	Sig
	P5	0.152	1.348**	0.000	0.719**	0.002	0.175	0.379	-0.85**	0	0.000
SOS	P1	0.236	1.522**	0.000	0.222	0.389	0.817**	0.001	0.028	0.873	0.000
	P2	0.13	1.238**	0.000	-0.072	0.761	0.285*	0.082	0.044	0.729	0.000
	P3	0.043	1.164**	0.000	0.069	0.811	0.067	0.711	-0.287**	0.048	0.000
	P4	0.076	1.131**	0.000	0.008	0.973	0.393**	0.023	-0.48**	0.001	0.000
	P5	0.147	1.272**	0.000	0.516**	0.031	0.563**	0.003	-0.749**	0	0.000
GOV	P1	0.049	1.174**	0.002	0.194	0.393	0.709**	0.002	0.239	0.166	0.000
	P2	0.141	1.317**	0.000	-0.177	0.577	0.465**	0.005	-0.341**	0.008	0.000
	P3	0.179	1.287**	0.000	-0.082	0.735	0.065	0.664	-0.319**	0.01	0.000
	P4	0.114	1.262**	0.000	0.237	0.252	0.251	0.173	-0.399**	0.008	0.000
	P5	0.149	1.286**	0.003	0.446*	0.075	0.636**	0.011	-0.625**	0.002	0.000
Significant Positive		30			11		19		-		
Significant Negative		-			3		-		21		
Not significant		-			16		11		9		

Notes: *sig. 5%, **sig. 10%

4.3 Comparison of the Validity of the Fama-French Model and the ESG Model in explaining stock excess returns.

The ESG model has a higher adjusted r-squared value for the 18 portfolios. On average, the Fama-French model has an adjusted r-squared value of 0.459, which indicates that the independent variables market return, size, and BME can explain the dependent variable excess return portfolio by 45.9%. In contrast, the remainder, which is a value of 54, 1% is the influence of other factors in the study not included. In the four-factor ESG model, the adjusted r-squared value is 0.498, which indicates that the independent variable's market return, size, BME, and ESG Score can explain the dependent variable excess portfolio return of 49.8%. In contrast, the remainder, a value of 50 .2%, is the influence of other factors in the study not included. Descriptively, the ESG model can explain excess returns better than the Fama-French model in the LQ45 sample from 2015 to 2019. Two-sample paired t-test tests a better model when the corrected r-squared is known. Table 6 shows a t-count of 3.378 from the t-test. The t-table value with $\alpha = 5\%$ and a degree of freedom of 29 is 1.699. Because the t-count > t-table (3.378 > 1.699), and the significance value is smaller than $\alpha = 5\%$ (0.002 <0.05), the ESG model is better in explaining returns than the Fama-French as indicated by the adjusted r-squared value can conclude.

Table 6. Paired sample t-Test

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	Df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	ESG – FF	0.038567	0.062532	0.011417	0.015217	0.061917	3.378	29	0.002

The second hypothesis states that the ESG model can better explain stock excess returns. A better-adjusted r-squared value in the four-factor ESG model indicates that a company's ESG score can be a factor that helps investors understand stock return movements. ESG models that can better explain returns can be triggered by increasing trends in ESG investing and using ESG factors to reduce investment risk (Díaz et al., 2020). The risk factors in a multi-factor model are not constant, and new risk factors are constantly developing, which can better explain returns (Fama & French, 2015). The results of this study provide evidence that ESG is a factor worth considering when investing. Although the adjusted r-squared differs only by about 4% on average, this could be due to the slow adoption of corporate strategy and the different characteristics of the Indonesian stock market.

The results of this study are in line with previous findings, as found by Pollard et al. (2018), who found that significant ESG becomes a risk factor when integrated with a portfolio and the potential for ESG to be a risk factor along with more proven factors such as company size, momentum, value, and liquidity. Hübel & Scholz (2020) also found that the ESG factor adds to the explanatory power when calculated using the Fama-French five-factor model. Díaz et al. (2020) examined the influence of the ESG factor using the Fama-French three-factor model during a crisis, namely the covid-19 pandemic. They also found that the ESG factor could explain returns significantly in the American stock market, where the Environment and Social pillars, in particular, were the pillars that most influenced returns in various industry sectors.

5. Conclusion

This study aims to analyze the effect of ESG performance on stock excess return, two models tested. According to testing, ESG performance negatively affected 21 portfolios and did not affect 9 portfolios. The negative effect may reflect that high ESG companies tend to have lower risk than low ESG companies, so investors require higher returns for low ESG companies. Investors may also view ESG as an additional cost that reduces the company's income. Therefore, most models show that ESG has a significant negative effect. Furthermore, there is a significant difference in adjusted r-squared values between the ESG and Fama-French models, where the ESG model is a better model than the Fama-French model in explaining excess returns because it has a more significant adjusted r-squared value.

The company's ESG score derived from the average individual environmental, social, and government scores, which have extreme values, may not be able to explain the actual situation, so there is an overlapping effect between each score and may produce inaccurate results in describing the relationship between ESG and stock returns. The limited company ESG data available for Indonesian companies can also cause the picture of the effect between ESG and returns to be less accurate because several companies have not included sustainability reports in the year the research sample was taken. Besides that, in this study, there is no difference in company characteristics based on industry, which has the possibility of reacting differently to existing variables. It is suggested that investors should consider the ESG factor in investing and can also use the four ESG factor models. As for further research, it is hoped that it will extend the research period to obtain a better picture. Add other risk factors that can better explain returns. Analyzing returns by industry to understand the influence of the model on the characteristics of different industries. Added other indicators that can clarify the strength of ESG in the Fama-French model, such as AIC (Akaike Information Criterion) and SSE (Sum of Square Error)

Author Contribution

Author 1: conceptualization, writing original draft, data curation, formal analysis, investigation, methodology.
Author 2: review and editing, writing review and editing, supervision, validation, visualization.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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