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The Risk Implications of ESG Performance: An Empirical Analysis of Norwegian Listed Companies (2014 – 2023)

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ABSTRACT:
This thesis examines how companies' ESG (Environmental, Social, Governance) scores are reflected in the equity risk of Norwegian listed companies between 2014 and 2023. The study focuses on risk, which is measured by two indicators: the annual volatility of the stock price and systematic risk (beta). The empirical data consists of firm-level observations and annually formed ESG portfolios. The methodology is based on linear regression models used to analyze the relationship between overall ESG scores, individual ESG dimensions (E, S, and G), and risk measures.

The results show that higher ESG scores are consistently associated with lower volatility, and this association remains statistically significant even after controlling for firm size and beta. Among the ESG components, the environmental dimension exhibits the strongest negative association with volatility. In contrast, the association with systematic risk (beta) is positive but weak, and not statistically significant in most models. The portfolio analysis confirms the firm-level findings: companies with low ESG scores display higher average volatility than those with a high ESG level.

The findings support the view that a strong ESG profile can function as a risk management tool by reducing firm-specific, idiosyncratic risk. At the same time, ESG does not appear to serve as a hedge against systematic market risk. The results are consistent with prior literature suggesting that ESG performance conveys meaningful risk-relevant information to investors.

ABSTRACT in Finnish:
Tässä tutkielmassa tarkastellaan, kuinka yritysten ESG-pisteytys (Environmental, Social, Governance) heijastuu norjalaisten pörssiyhtiöiden osakeriskiin vuosina 2014–2023. Tutkimuksen näkökulma keskittyy riskiin, jota mitataan kahdella indikaattorilla: osakekurssin vuotuisella volatiliteetilla sekä systemaattisella riskillä (beta). Empiirinen aineisto koostuu yritystason tiedoista ja vuosittain muodostetuista ESG-portfolioista. Menetelmänä käytetään lineaarisia regressiomalleja, joilla analysoidaan ESG:n kokonaispisteiden ja yksittäisten osa-alueiden (E, S ja G) yhteyttä riskimuuttujiin.

Tulokset osoittavat, että korkea ESG-pisteytys on johdonmukaisesti yhteydessä matalampaan volatiliteettiin, ja tämä yhteys säilyy tilastollisesti merkitsevänä myös kontrollimuuttujien, kuten yrityskoon ja betan, lisäämisen jälkeen. Erityisesti ympäristöulottuvuudella havaittiin vahvin negatiivinen yhteys riskiin. Sen sijaan yhteys systemaattiseen riskiin (betaan) oli positiivinen mutta heikko, eikä se ollut tilastollisesti merkitsevä useimmissa malleissa. Portfolioanalyysi vahvisti yritystason havainnot: matalan ESG-tason yhtiöillä oli keskimäärin korkeampi volatiliteetti kuin korkean ESG-tason yhtiöillä.

Tutkimus tukee käsitystä siitä, että vahva ESG-profiili voi toimia riskienhallintatyökaluna ja vähentää yrityskohtaista, idiosynkraattista riskiä. Samalla havaintojen perusteella ESG ei näyttäydy systemaattisen markkinariskin suojauskeinona. Tulokset tukevat aiempaa kirjallisuutta, jonka mukaan ESG-suoriutuminen sisältää sijoittajille olennaista riskisignaalia.

KEYWORDS: (ESG performance, equity risk, risk management, beta, sustainability, socially responsible investing).

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1 Introduction

The importance of ESG investing in investors' decision-making has increased significantly in recent years. Bloomberg Intelligence (2023) predicts that global ESG investments could reach nearly USD 40 trillion by 2030, representing a significant share of total investment wealth. This would amount to approximately one-third of the projected USD 140 trillion in assets under management by 2030. In addition, in a survey contributed by Bloomberg Professional Services (2023), 85% of investors believe that ESG factors contribute to better returns, more resilient investment portfolios, and deeper analytical insight.

One of the theoretical foundations of ESG investing is stakeholder theory, which posits that companies' responsibility towards society can create economic success in the long term (Mahajan et al., 2023). An investment strategy based on ESG (Environmental, Social, Governance) factors assume that sustainability can enhance financial performance and mitigate risks.

More and more companies are investing more resources in improving ESG operations and are expressing these investments through ESG reporting, regardless of their industry or sector. Today, more than 90% of S&P-500 companies and about 70% of Russell 1000 companies publish some form of ESG report (Perez et al. 2022). On the other hand, the problems of reporting on sustainability include, for example, comparability and the discrepancies between the assessments of different ESG rating agencies, which can make investors' decision-making more difficult (Galant and Cadez, 2017; Matuszak and Rozanska, 2017). However, investors may have dual motives: while they are looking for returns, they want to promote sustainable values through their investments. ESG-driven investors may choose an investment that supports sustainable values, even if its returns do not reach the same as traditional alternatives (Rield and Smeets, 2017).

Over the past decade, a large number of studies have been published that have examined the link between ESG performance and companies' financial performance, risk and

market value. However, previous research results are partly contradictory regarding whether a high sustainability score provides concrete added value to shareholders. Some studies have found a positive connection between the ESG score and the company's market capitalization or profitability, while some studies have found no significant impact and some studies have even found a negative connection. For example, Velte (2017) examined the ESG scores of German listed companies and found a positive correlation with profitability. Similarly, Yoon et al. (2018) found that ESG scores were positively associated with the market capitalization of Korean companies.

Especially from a risk perspective, the role of ESG in shaping companies' risk profiles has been increasingly emphasized. Numerous studies suggest that good ESG performance can serve as a risk management tool. Salama et al. (2011), Sassen et al. (2016), and Horn (2023) have found that a high ESG rating is associated with lower levels of both systemic and idiosyncratic risk. Based on the research results, ESG can act as a protective factor that stabilizes the company's future cash flows and lowers the cost of capital. These characteristics are crucial for both investors and companies.

However, it is important to understand that the link between ESG and a company’s financial performance is not always straightforward. Brammer et al. (2006) and Hong and Kacperczyk (2009) have reported that companies with lower ethical standards may achieve higher returns. In addition, Nollet et al. (2016) found a negative correlation between ESG and financial performance, although most of the results were not statistically significant. Similarly, the studies by Land and Sciarelli (2019) and Alves et al. (2025) did not find any statistically significant relationship between ESG ratings and stock returns.

The Norwegian stock market is considered an interesting subject to study, especially because of its unique ESG profile. For example, Leirvik et al. (2021) show that Norwegian institutional investors have increasingly shifted towards responsible investing. At the same time, Busch and Friede (2018) point out that the integration of ESG risks plays an

important role in the decision-making of Norwegian investors, and that in Norway, responsible investing is not only a value-based choice but also a risk management tool. In addition, Sassen et al. (2016) emphasize the importance of ESG factors in shaping companies' risk profiles in the Nordic countries, including Norway. Norway's economy remains heavily reliant on energy sector, with oil and gas accounting for 87% of total energy production in 2022, while electricity generation is dominated by renewables, primarily hydropower (IEA, 2022a) At the same time, Norway participates in the EU`s climate policy instruments, including the EU Emission Trading System (EU ETS), as well as frameworks for burden sharing and land use regulation for 2021 – 2030 (IEA, 2022b) This dual position, as a fossil energy superpower and proponent of a low-carbon future, highlights Norway's relevance in ESG-related research.

1.1 Purpose of this study

The purpose of this study is to find out how companies' ESG scoring affects the equity risk and market capitalization of Norwegian listed companies. The study focuses especially on the risk aspect, i.e. examining whether companies with a higher ESG rating are at a lower risk than companies with a lower ESG rating, and at the same time assessing whether ESG performance is reflected in the market valuation of companies.

Previous research on the relationship between ESG performance and financial outcomes has yielded mixed results. While some studies report positive effects, others find no significant association. Landi and Sciarelli (2019) examined the link between ESG performance and abnormal stock returns but found no statistically significant connection. Similarly, Alves et al. (2025) concluded that ESG scores are not systematically related to equity returns across different regions, data providers, or ESG dimensions. Brammer et al. (2006) also reached the conclusion that although the results may be economically meaningful, they are generally not statistically significant. These findings suggest that ESG scores may not serve as reliable indicators of financial risk or return behavior.
Based on this, the null hypothesis is formulated as follows:

H_0: ESG scoring does not have a significant impact on risk and stock price variability

Several empirical studies support the view that ESG performance can serve as a mechanism for reducing firm-level risk. Sassen et al. (2016) found that firms with strong ESG profiles, particularly in the environmental dimension, were associated with lower levels of idiosyncratic and total risk. Horn (2023) similarly reported that firms with high ESG scores demonstrated lower stock price volatility, especially during periods of financial instability. Salama et al. (2011) also noted that environmental and community-focused corporate responsibility initiatives were linked to decreased systematic risk. These findings suggest that ESG engagement may enhance stakeholder trust, improve operational stability, and thereby reduce exposure to both market-driven and firm-specific risk factors. Based on this, the alternative hypothesis is formulated as follows:

H_1: ESG scoring has a negative impact on firm-level risk, reducing volatility and market beta

While much of the literature suggests a risk-reducing effect of ESG, several studies also point to potential mechanisms through which ESG engagement may increase firm-level risk. Brammer et al. (2006) found that socially responsible portfolios were sometimes exposed to higher volatility, particularly due to sector constraints and concentration in specific industries. Sassen et al. (2016) also emphasized that the relationship between ESG and risk can vary depending on the ESG dimension and underlying firm characteristics, suggesting that governance-focused initiatives may sometimes correlate with increased uncertainty. Furthermore, Horn (2023) observed that not all ESG-rated firms demonstrated superior stability, firms with strong ESG credentials may still be subject to high beta values in certain market conditions. These mixed findings highlight that ESG engagement can, in some contexts, signal strategic complexity or limit diversification, both of which may elevate exposure to price fluctuations or systematic shocks. Based on these mixed findings the alternative hypothesis is as follows:

H_2: ESG scoring has a positive impact on firm-level risk, increasing volatility and market beta.

1.2 Structure of the thesis

The thesis is structured into six main chapters. Following the introduction, Chapter 2 presents the theoretical background, including foundational concepts such as portfolio theory, the Capital Asset Pricing Model (CAPM), and the role of risk in investment decisions. Chapter 3 reviews the relevant literature, focusing on previous research regarding the relationship between ESG performance, financial returns, and firm-level risk. In Chapter 4, the data and methodology used in the empirical analysis are described in detail, including variable definitions, portfolio construction, and the regression models applied. Chapter 5 presents empirical results at both the firm and portfolio levels, including an assessment of ESG score components. Finally, Chapter 6 provides a discussion of the findings, limitations of the study, and suggestions for future research.

2 Theoretical background

This chapter presents classic key financial theories that support the theoretical framework of the study. Theories provide a foundation for understanding the mechanisms of risk, return and market behavior. These theories offer a conceptual basis for interpreting the results of the research and evaluating the role of ESG in investment decision-making.

2.1 Modern portfolio theory

Markowitz's (1952) Modern Portfolio Theory (MPT) is one of the key theories in financial science, explaining the relationship between return and risk. The core idea of the theory is that investors can achieve better risk-adjusted returns by optimally diversifying their portfolio. The premise of the theory is that each investment has both an expected return and a risk, and effective diversification of the portfolio can reduce the risk associated with individual assets. The lower the correlation between different investments, the better the diversification works in reducing risk. The theory allows for the highest possible expected return at the given risk level or, alternatively, the lowest possible risk for the set return target. Based on this, the so-called effective frontier can be determined, which consists of those portfolios with the best possible return-risk ratio.

Figure 1 shows the efficient frontier of three assets. Adding some amount of asset D, investor can lower the risk for every portfolio expected return. In the figure the assets are labeled as A, B, and D. The minimum variance portfolio moves from C to C'. The expected return of asset D is between assets A and B, so the range of the expected returns does not change. The assumption is that asset D is not perfectly correlated with A and B. (Petzel, 2021)

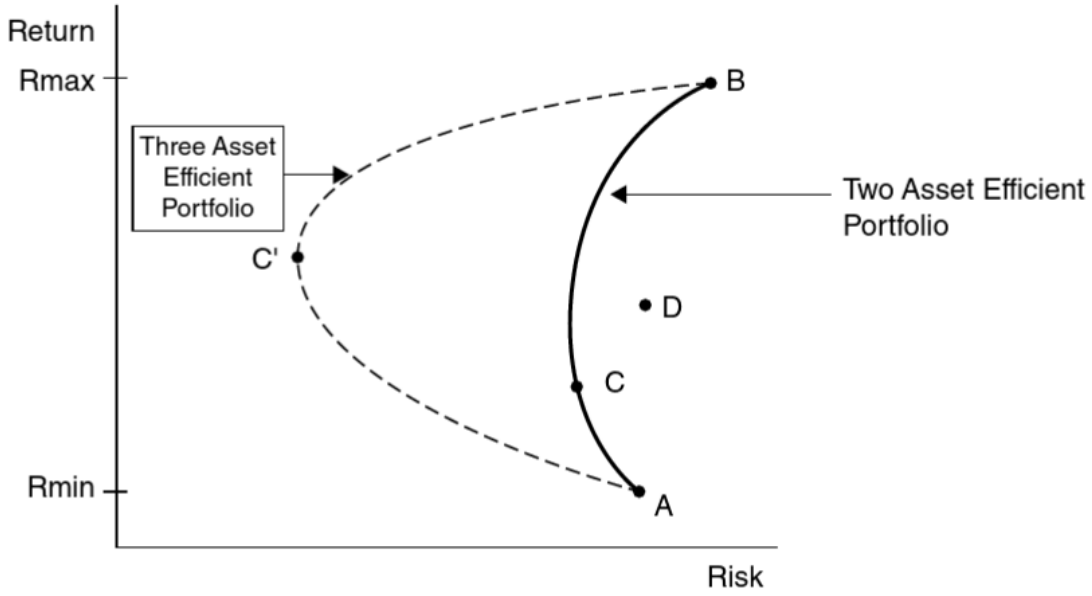

Figure 1. The Three-Asset Efficient Portfolio (Pezel, 2022)

2.2 Efficient market hypothesis

The Effective Market Hypothesis (EMH) is one of the cornerstones of financial theory. Eugene Faman (1965) states that the prices of securities always reflect all information, which excludes the possibility of an investor making excessive returns. According to Fama, there are a large number of rational and profit-maximizing actors in an efficient market, which is why the prices of securities constantly reflect the effects of what has already happened and what the market expects in the future. The theory also assumes that all available information is fully understood and that understanding new information between investors is just as effective.

2.2.1 Theory of random walks

In a market that is efficient in the theory of random walks, the actions of many competing investors cause the actual price of a security to move randomly around its intrinsic value. Fama (1965) argues that if the price difference between true value and intrinsic value were not random but systematic, smart investors could use this information to predict price movements towards true value. According to the theory, history cannot be used to predict future price developments in any meaningful way and investors cannot earn excessive returns. Therefore, technical analysis that seeks to estimate the future price through past price patterns is useless. Also, fundamental analysis is useless in an efficient market, as everyone has access to the same amount of information and knows how to use it equally effectively. Fama lists the quality of leadership, the state of finances and outlook for the industry as fundamental factors.

2.2.2 Three market efficiency forms

Fama (1970) divided market efficiency into three different categories: weak-form, semi-strong form, and strong form. In a market of weak-form efficiency, all historical trading information is reflected in the share price. In a market with a weak form, it is not possible to achieve excessive returns through technical analysis.

The market has a semi-strong form when stock prices reflect not only historical data, but also all publicly available information. This means that investors make effective use of financial statement analysis, company news, as well as other macroeconomic indicators. Exaggerated returns through fundamental analysis are impossible, as all investors have access to the same information and understanding of it (Fama, 1970).

In the Strong Form market, investors have access to all possible information, both public and private. Despite insider information, excessive returns cannot be achieved in the market, as the share price effectively reflects all possible information (Fama, 1970).

2.3 Criticism of EMH

Woo et al. (2020) highlights many market anomalies in their research. The study challenges the theory of efficient markets and highlights several drawbacks, such as abnormal returns and unexpected behavioral patterns. Szymański & Wojtalik (2020) also highlight shortcomings in the complete efficiency of the market. The study finds that calendar effects such as "day-of-the-week" and "month-of-the-year" occur in Central European markets. Rossi & Gunardi (2018) also present empirical evidence from several European markets that violate the assumptions of the EMH with potential abnormal profit opportunities.

Shiller (2000) argues in his paper that efficient pricing of securities does not occur in situations where a so-called bubble is created in the market. The study notes that an investment bubble can be caused by a situation where the owners of the shares believe that they can sell the asset at an even higher price in the future and due to increasing demand, the market price of the asset exceeds its fundamental value. Malkiel (2003) questions the realization of an efficient market through the IT bubble of the late 1990s. During IT-bubble, the shares of companies operating in the technology sector rose well above their true value, until the bubble burst in the early 2000s and the value of the companies' shares fell drastically. Malkiel states that this is an indication that the market can function inefficiently for long periods of time.

2.4 Capital asset pricing model (CAPM), Sharpe Ratio & Jensen`s Alpha

The Capital Asset Pricing Model (CAPM) aims to find the expected return on a stock. CAPM is based on the work of several contributiors, but the theoretical basis of the model has been created by the previously mentioned researcher Markowitz (1952) with modern portfolio theory. The actual model was developed by Sharpe (1964), Lintner (1965) and Mossin (1966). In the model, the expected return of a security is determined by a risk-free market interest rate, a market premium and a beta multiplier that reflects systematic risk in the market. CAPM formula is as follows:

$$E(R_i) = R_f + \beta_i \times \left[E(R_m) - R_f\right] \quad (1)$$

where:

$E(R_i)$ = Expected return of security

R_f = Risk free rate

β_i = Beta of the security

$E(R_m)$ = Expected market return.

The Sharpe ratio (Sharpe, 1966) measures the risk-adjusted return of an investment. The figure describes how much extra return the investment generates for each unit of risk taken. For investors, the Sharpe ratio is important to understand, as looking at returns without taking risk into account is misleading. The higher the value of the Sharpe ratio, the better the investment has performed relative to volatility. A low number, on the other hand, indicates poor performance in relation to risk (Sharpe, 1966). Formula is as follows:

$$Sharpe\ ratio = \frac{R_p - R_f}{\sigma_p} \quad (2)$$

Where:

R_p = Rate of return of portfolio (or investment)

R_f = risk-free rate

σ_p = Standard deviation of portfolios (or investment`s) returns.

Jensen's Alpha (Jensen, 1968) measures the abnormal return of a portfolio. This refers to the alpha of the portfolio, i.e. the return that exceeds the market return when adjusted for risk. Such a situation arises when the risk-adjusted return of the portfolio is higher than the risk-adjusted return of the market. If alpha is positive, the portfolio has yielded more than the pricing model's forecast. When alpha is negative, the return has fallen short of the forecast expectations (Jensen, 1968). The formula is as follows:

$$\alpha_p = R_p - \left[R_f + \beta_p\left(R_m - R_f\right)\right] \quad (3)$$

Where:

α_p = Jensen`s Alpha of portfolio (or investment)

R_p = actual return of the portfolio (or investment)

R_f = risk-free rate

β_p = beta of portfolio (or investment)

R_m = return of the market portfolio

Bodie et al. (1977/2023) demonstrate the calculation of Jensen`s Alpha in Figure 4, using an example where risk-free rate is 6%, the stock`s beta is 1.2, and the market return is 14%, resulting in an implied alpha of 1.4%.

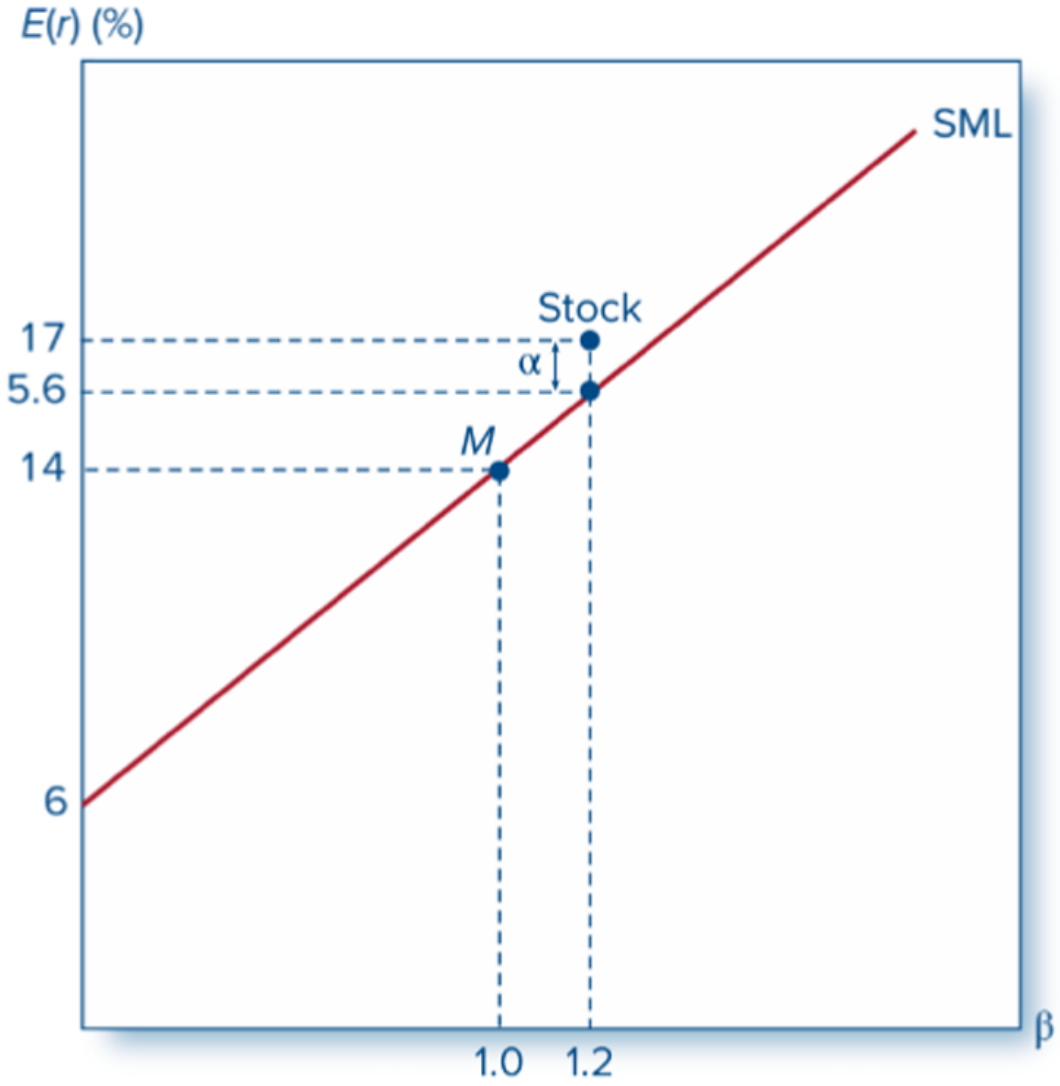

Figure 2. The SML and a positive-alpha stock (Bodie et al., 1977/2023, p. 291)

2.5 Socially responsible investing and ESG investing

SRI (Socially responsible investing) and ESG (Environmental, Social, governance) investing aim to combine the ethical values of investing with social goals. The terms are often used alongside, although there are differences that differ both philosophically and based on their practical approaches. When talking about responsible investing, it is important to understand the differences between SRI and ESG investing. Socially Responsible Investment (SRI) originated from ethical and religious values. Its aim is to exclude investments that are morally harmful. In the United States in the 1960s and 1970s, the SRI

model evolved from religion-based values, civil rights, women's rights and environmental movements. The Pax World Balanced Fund, established in 1971, and the Dreyfus Third Century Fund, established in 1972, were the first socially responsible funds. The funds focused on avoiding harmful companies and industries, such as the arms industry or the polluting industry. Instead, the funds focused on companies that promote the quality of life in America (Townsend, 2020).

Study of Chong & Phillips (2016) compares the differences between SRI and ESG investing. They argue that SRI has traditionally been based on exclusionary screening, where investors seek to avoid companies and industries that are contrary to their values. Such so-called "sinful" industries include, for example, defense/weapons, alcohol, tobacco and gambling. Investment decisions are based on value-based thinking, in which social or moral reasons guide decision-making more than economic indicators. ESG investing, on the other hand, does not avoid "sinful" industries, but aims to identify and reward companies that perform well in ESG-related matters. In other words, ESG investing brings an inclusionary screening alongside exclusionary screening. In addition, it uses a so-called "best-in-class" assessment (Chong & Phillips, 2016).

The study by Rield and Smeets (2017) shows that many investors choose sustainable investments, even if they do not yield as much as traditional alternatives. They argue that investors get satisfaction and peace of mind when they invest in companies that align with their values. The study shows that people who invest responsibly are interested in environmental and social issues. According to them, this explains why ESG factors influence the decision-making of these investors, even if they are not always directly related to returns. This suggests that investors' behavior is influenced by both financial and non-economic motives (Rield and Smeets, 2017).

3 Literature review

This chapter provides an overview of prior academic research on the relationship between ESG performance and financial outcomes, with a particular focus on firm-level risk. The aim is to position the present study within existing literature by summarizing key findings, theoretical perspectives, and empirical evidence. The review is structured into three thematic areas: the link between ESG and financial performance, the association between ESG and risk, and the role of individual ESG components.

3.1 The evolution of ESG

As previously noted, SRI began to emerge in the 1960s and 1970s and the first SRI funds were established at the turn of the decade with the aim of not only maximizing returns but also promoting the quality of life in America (Townsend, 2020). In the early 2000s, corporate social responsibility (CSR) began to become institutionalized, largely due to increasing pressure from investors, regulators and society. These parties made stronger demands in terms of transparency and accountability. The rise of ESG metrics led to a big change, as ESG provided standardized tools for assessing environmental impacts, social responsibility, and governance structures, unlike CSR (Passas, 2024).

The supply of ESG-compliant investment products has grown rapidly in recent years. The ESG strategy chosen affects how investors perceive the quality of a fund. In particular, the so-called inclusion-based strategy is perceived as the highest quality. Although it is an ESG fund, this effect is explained less by the perceptions of sustainability and more by perceptions of financial quality (Carlsson Hauff and Nilsson, 2022). When retail investors consider investing in funds managed in accordance with ESG principles, their decision-making is often influenced by financial interests, sustainability goals and value-based views (Paetzold et al., 2022). In the light of these findings, it is also important to examine how companies communicate their sustainability actions to investors.

Galant and Cadez (2017) argue that the inconsistencies in the relationship between CSR and economic performance are largely due to measurement issues. According to them, CSR is very challenging to measure due to its multidimensionality, lack of reporting standards and the subjectivity of researchers. Similar challenges were also found by Matuszak and Rozanska (2017), who studied the extent and quality of CSR reporting in Polish listed companies. Their research shows that the coverage and quality of reporting varies considerably between companies and industries. In particular, anti-corruption measures and human rights issues were frequently lacking.

The issues highlighted by Galant and Cadez (2017) and Matuszak and Rozanska (2017) are being addressed at the European Union level through directive (Directive (EU) 2022/2464, 2022) that entered into force in 2023 and aims to harmonize and improve comparability. The directive obliges large and listed companies to report on their ESG performance gradually starting from the financial year 2024, and the first reports will be published in 2025.

3.2 Effects of ESG on Risk and Financial Performance

This section examines how ESG performance and responsible investment (SRI) influences profitability, firm value and risk exposure. It is important to gain a deeper understanding of how ESG factors affect a company's profitability, valuation, and risk level. The studies presented in this chapter are divided into four groups based on the results: positive effect, negative effect, no significant effect, and mixed results. The section helps to understand the circumstances in which ESG can affect a company's financial performance and investors' return expectations.

3.2.1 Positive impact

Velte (2017) supported German listed companies (DAX30, TecDAX, MDAX) and their ESG performance in relation to their profitability and company value. The analysis showed

that ESG scores are positively and significantly associated with profitability, but no statistically significant impact was found on a market-based indicator. Profitability was measured by ROA and the firm value by Tobin's Q. In particular, governance (G) was found to have a significant positive correlation with financial performance. This supports the argument that good ESG performance is reflected in higher financial performance. Yoon et al. (2018) found very similar results. Their study examined 705 Korean listed companies and the impact of their ESG performance on their market capitalization. The results show that the total ESG measure and all three of its factors had a positive impact on the company's valuation. The results were statistically significant. The study also found that the effect was not uniform across all industries. In environmentally sensitive industries, the positive valuation effect was not as strong as in other industries. The results suggest that in family businesses, governance received a more highly valuation, which is a similar finding to Velte's (2017) study.

Salama et al. (2011) examine more than 1600 British companies from 1994 to 2006. The study compared the impact of community and environmental responsibility (CER) ranking on the company's riskiness. The results show that a better CER ranking has a statistically significant negative association with systematic financial risk. The study reveals that a one-unit improvement in CER scoring led to a decrease of 0.028 units in the beta coefficient. Salama et al. (2011) argue that although the impact on the cost of capital is small, environmental responsibility can still serve as a risk management tool. The results support the view that good social responsibility can be presented as a lower market risk. Lower risk makes the company's future cash flows more reliable and predictable and benefits the residual investors in the long run. Sassen et al. (2016) found similar results when they examined data from more than 8700 firm-year observations from European companies between 2002 and 2014. The study compared the impact of ESG on three risk indicators: systematic, idiosyncratic and overall risk. The results show that a high ESG score reduces both idiosyncratic and total risk. Of the ESG factors, social performance (S) was statistically significantly negatively associated with all three risk indicators. Environmental performance (E) reduced idiosyncratic risk. Governance performance (G) was not

found to have a statistically significant effect on risk. The results support the claim that high ESG performance can improve a company's value by lowering its risk and cost of capital (Sassen et al., 2016). Horn (2023) examined 898,757 company-month observations of U.S. stocks from 1991 to 2018 to assess the impact of ESG ratings on idiosyncratic risk and found similar conclusion. The results indicate that just getting an ESG rating significantly reduces a stock`s idiosyncratic risk. The impact is stronger with higher ESG ratings, but companies with low ratings also show lower risk than non-rated ones. Additionally, negatively screened stocks demonstrated particularly low idiosyncratic risk during recessions. The results are robust across different time periods, industries, and company profiles, suggesting that ESG ratings and negative screenings independently influence corporate risk profiles.

Tang et al. (2024) studied the impact of the ESG performance of Chinese listed companies on the company's value and investor confidence in 2009–2022. The study shows that ESG performance has a positive impact on a company's market capitalization. Investor confidence is seen to have a significant impact on strengthening this relationship. Empirical models show that ESG scores were significantly associated with a higher Tobin's Q, which was used to measure the value of companies. The findings of the study were similar to those of Velten (2017) and Yoon et al. (2018), as Tang et al. (2024) examines ESG factors, and the results show that governance factors (G) had the greatest impact to firm’s value, while environmental factors (E) were the weakest.

Zheng et al. (2025) studied the impact of 315 US and Chinese banks' ESG performance (ESGP) on the company's value in 2011 - 2022, as well as the potential competitive advantage it provides in. The results show that ESGP had a positive impact on the company's value. The findings were statistically significant. The study argues that sustainability is seen as a strategic resource. The results also found that the effect is non-linear. This means that the benefits of sustainability measures will initially grow faster, but the benefits will be diminished if the investment is excessive. The results of the study also show

that the positive impact of ESGP on the value of a company is weakened if there is environmental uncertainty (Zheng et al., 2025).

The studies presented above support the thesis 1st hypothesis. The findings show that ESG score, and sustainability have a positive impact on companies' value, risk and cost of capital. Velte (2017), Yoon et al. (2018), and Tang et al (2024) found in their studies that the governance factor (G) had the greatest impact on the value of a company. Zheng et al. (2025) and Fatemi et al. (2018) also found that there is a positive correlation between sustainability and company value. Salama et al (2011) and Sassen et al. (2016) studied the same topic from slightly different perspectives, and the results of both studies agreed that sustainability reduces a company's risk, which can be seen to have a positive impact on the company's value.

3.2.2 Negative impact

Brammer et al. (2006) and Hong and Kacperczyk (2009) examined the relationship between social responsibility and equity returns from slightly different perspectives but came to similar conclusions. Brammer et al. (2006) investigated the relationship between the social responsibility (CSP) and equity returns of UK listed companies between 2002 and 2005. In the research, CSP is divided into three areas: environmental responsibility, community responsibility and the treatment of employees. The results of the study show that a high CSP is negatively correlated with equity returns. The results are financially significant, but statistically they are not significant in most cases. Companies with zero scores on all CSP factors had the best returns on average and even exceeded the market index's returns. Brammer et al. (2006) argue that ethically weakest firms achieve significant excess returns. The researchers suggest that certain CSR measures reduce shareholder value, especially in the case of environmental and community scores, due to their association with lower returns. Hong and Kacperczyk (2009) found similar results to those of Brammer et al. (2006) when examined the so-called sin stocks in the US market. The subject of the study was the alcohol, tobacco and gambling industry. Empirical research from 1980 to 2006 shows that sin stocks offered higher returns. As

possible explanatory factors for the phenomena, the study argues that institutional investors avoid sin stocks and that analyst monitoring of stocks is lower, which reflects a lower valuation. The results of the study also remained statistically significant in the European and Canadian markets, where the annual returns were 2.5% (Hong and Kacperczyk, 2009).

Supporting these earlier findings, Nollet et al. (2016) studied companies in the S&P 500 index from 2007 to 2011. The study examined the relationship between corporate social performance (CSP) and corporate financial performance (CFP). Financial performance was measured both with accounting metrics such as ROA and ROC and on a market-based indicator, excess returns. The results show a negative, but mostly statistically insignificant, association between CSP and CFP. As measured by the Return on Capital (ROC) indicator, a statistically significant negative impact was observed. Nollet et al. (2016) argue that long-term investment in ESG factors may improve a company's profitability in the long term and give investors a signal of the company's commitment to sustainability.

These studies (Brammer et al., 2006; Hong and Kacperczyk, 2009; Nollet et al., 2016) show that high corporate social performance may be associated with lower equity returns. Studies show that companies classified as ethically questionable or without CSP measures in particular have been found to deliver higher returns. This supports the second hypothesis that ESG scoring can have a negative impact on the performance of an investment portfolio.

3.2.3 No significant impact

Landi and Sciarelli (2019) studied the impact of ESG performance on the market-based financial performance of companies in 40 Italian listed companies. The research data covers 2007 to 2015, and Jensen's alpha was used as a measure of financial performance. The study shows that ESG ratings do not have a statistically significant impact on abnormal returns. ESG scores were not found to have a negative or positive impact on excess returns in the stock market. Instead, the study found that investors tend to follow more

traditional risk factors, such as profitability and the company's indebtedness. Similar results were found by Alves et al. (2025) when they examined the impact of ESG scoring on equity returns using global data. The study used more than 16,000 companies from 48 countries between 2001 and 2020. The study finds that ESG scores do not have a systematic or statistically significant relationship with equity returns. The findings were consistent across all seven ESG data providers used in the analysis and remained the same regardless of region or ESG pillar examined. Both Landi and Sciarelli (2019) and Alves et al. (2025) concluded that ESG scoring cannot be considered a reliable investment signal.

3.2.4 Mixed results

Strekalina et al. (2023) analyzed the relationship between ESG performance and financial performance using different metrics, yet their findings partly aligned with those of Brammer et al. (2006) and Hong and Kacperczyk (2009), suggesting that sustainability can lead to lower returns. Strekalina et al. (2023) investigated the impact of ESG scoring on a company's financial performance. The study used data from 257 listed companies in the BRICS countries (Brazil, Russia, India, China and South Africa) from 2017 to 2021. The financial performance of the companies was measured with three different indicators: accounting profitability was measured by ROA, market-based total return by TSR, and economic added value by EVA spread. The results show that ESG performance has a negative impact on both accounting profitability and economic added value. This suggests that ESG performance may be linked to lower profitability. Environmental and social factors were positively associated with market-based return (TSR). The authors suggest that this is due to investors' confidence in the company. The study emphasizes, similar to the conclusions of earlier studies (Galant and Cadez, 2017; Matuszak and Rozanska, 2017) that a key factor in assessing the impact of ESG depends on the metrics used.

Fatemi et al. (2018) also found mixed results when examining the ESG performance of 1640 U.S. listed companies and the impact of ESG reporting on firm value between 2006 and 2011. The study found that ESG strengths had a positive impact on the company's

value as measured by Tobin's Q, while ESG weaknesses had a negative impact on the company's value. In the study, ESG strengths refer to, for example, environmentally friendly investments or investing in employee well-being, while ESG weaknesses refer to problems such as poor working conditions or environmental damage. While higher ESG performance has a positive impact on the company's value, the study argues that ESG reporting benefited companies with weaker ESG. Companies that encountered sustainability issues may have benefited from more transparent reporting compared to responsible companies. Investors may see excessive reporting as excessive ESG investments or greenwashing (Fatemi et al., 2018).

3.2.5 Theoretical perspective

Empirical studies show that the effects of ESG performance and responsible investment (SRI) on a company's financial performance, risk and value are inconsistent. Modern portfolio theory emphasizes the importance of diversification in reducing the risk of an investment portfolio and achieving an optimal risk-return ratio. Several studies, such as Salama et al. (2011), Sassen et al. (2016), and Zheng et al. (2025), is consistent with the principles of MPT. According to studies, good ESG performance can reduce systematic and idiosyncratic risk and act as a risk management tool. Velte (2017), Yoon et al. (2018), Tang et al. (2024), and Fatemi et al. (2018) show through their research that good ESG performance can lead to better profitability and higher company valuation. These findings are consistent with the principles of MPT, suggesting that sustainability can enhance financial attractiveness and support portfolio efficiency.

On the other hand, the efficient market hypothesis states that all available information is immediately reflected in the prices of securities. Based on the EMH, ESG information should not provide investors with a systematic advantage. This perspective is supported by Landi and Sciarelli (2019) and Alves et al. (2025), whose studies did not find any statistically significant association between ESG scores, and equity returns. Similarly, studies by Strekalina et al. (2023) and Nollet et al. (2016) shows that ESG performance varies depending on the financial metrics used, indicating that the relationship is not consistent

across different measures. In addition to differences between ESG and financial risk in general, several studies emphasize that the three ESG dimensions, E-, S- and G-pillars, may influence firm-level risk in distinct ways. This suggests that ESG is not a uniform construct in terms of its relationship with risk, and that a component-level analysis may offer more precise insights. Based on this, the present study also investigates the individual effects of the E, S, and G pillars on volatility. Special thanks to Jemppa, Pete Chad and the boys!

4 Data and Methodology

This chapter describes the data sources, sample selection, and variables used in empirical analysis. The study is based on firm-level data from Norwegian listed companies, with a focus on the years 2014–2023. The chapter also outlines the construction of ESG-based portfolios, defines the key risk and control variables, and presents the regression models applied to assess the relationship between ESG performance and firm-specific risk.

4.1 Data Description and Sample Characteristics

The data for the study was collected from the Datastream, and it covers Norwegian listed companies from 2014 to 2023. All companies whose country of origin is Norway are selected, regardless of their listing. The final data includes a total of 119 unique companies, and the analyses are based on 610 company-year observations.

The variables used in the study are the ESG Score, Environmental, Social and Governance (E, S and G pillars), Market Capitalization, historical volatility of the share price, and beta. Market capitalization is used in log-transformed form, and the volatility measures the annual price fluctuation of a stock relative to its average price during the year. It captures how much the highest and lowest prices have deviated from the annual mean. For instance, a volatility of 20% indicates that the stock price has historically varied by ±20% around its average price within a given year. This metric differs from the more commonly used return-based volatility but still provides relevant insights into the extent of price variability, which is essential from an investor's risk perspective. Beta measures the sensitivity of a stock to the movements of the market portfolio.

Double-listed companies have been removed from the data, and the same company does not appear several times with different identifiers. Missing observations has been excluded on a model-by-model basis so that regression models only use observations where all the necessary variables are available.

In the descriptive analysis, companies are divided into three equal groups each year based on ESG scores. Based on the division, Low, Neutral and High ESG portfolios are formed, where the scores of the lowest third determine the “Low” class and the scores of the top third determine the “High” class. The averages of these groups are used to analyze the systematic differences in volatility, market capitalization and beta between different ESG levels, among other things.

The calculation of the ESG score is based on more than 870 ESG indicators, of which 186 most relevant metrics are used to create the final ESG Score resulting in a score ranging from 0 to 100. The points are divided into three main pillars, which are the E, S and G pillars. ESG scoring is done using a percentage-based percentile rank method, which enables consistent comparisons between different companies. The scoring also considers any ESG controversies, which are automatically tracked by LSEG`s screening system (LSEG, 2024a;2024b).

Figure 5 illustrates the structure of LSEG's ESG score. It presents three main pillars, which form the ESG score and the ESG Controversy score. This study focuses exclusively on the ESG score.

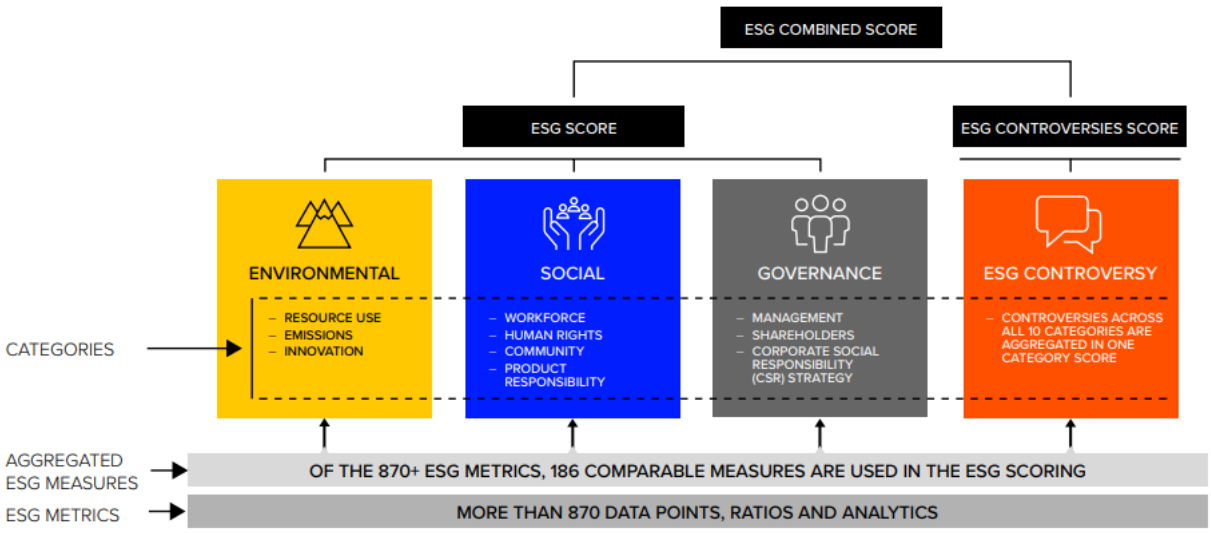

Figure 3. Structure of the ESG scoring and ESG Controversies framework (LSEG, 2024)

Figure 6 illustrates how the ESG score is composed of three main pillars, each built from several thematic categories. The ESG data used in this study is base on LSEG`s scoring methodology, which applies the relative weightings show in Figure 6.

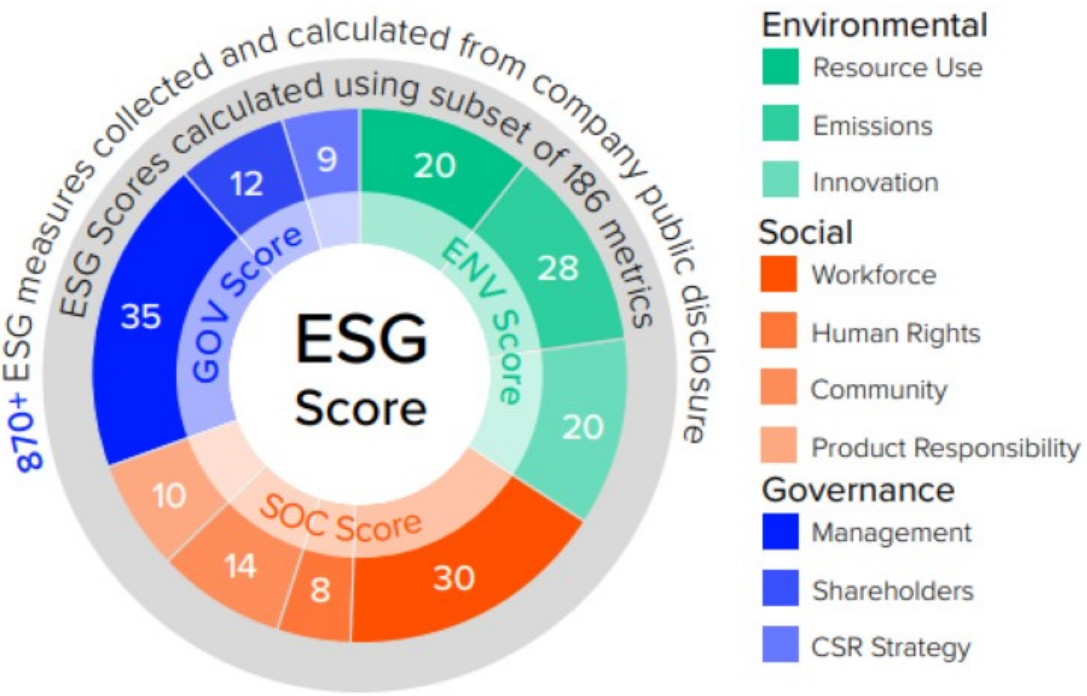

Figure 4. ESG score structure and key themes (LSEG, 2024)

Table 1 below illustrates the development and variation of Norwegian companies' ESG scores between 2014 and 2023. The results are divided into five two-year review periods. While the average ESG scores show only minor fluctuations, they have remained relatively stable over time. The increase observed in the 2022-2023 period may reflect improvements in sustainability practices and/or enhanced reporting standards. The table also shows that companies' sustainability reporting and performance have increased, but there is still dispersion between companies.

Table 1. ESG score summary statistics of Norwegian companies across five periods from 2014 to 2023.

Year	Average	StdDev	Min	Max	n
2014–2015	51.45	19.49	5.39	89.05	69
2016–2017	50.10	21.80	5.72	90.54	54
2018–2019	48.62	20.57	5.54	89.71	136
2020–2021	49.83	20.74	2.85	90.96	183
2022–2023	52.85	18.74	4.05	85.37	168

4.2 Empirical Methods

The first regression model examines the linear relationship between companies' ESG scores and risk, where risk is measured by annual price fluctuation of the stock relative to its average price. The regression model is as follows:

$$V_i = \alpha + \beta_i(ESG_i) + \epsilon \quad (4)$$

Where:

V_i = Volatility (annual price variation of stock i from its average price)

α = Intercept term

ESG_i = ESG score for company i

ϵ = Error Term

The second regression model expands on the previous model by including control variables to further explain the variation in stock price volatility. The model incorporates companies` ESG scores alongside firm size, measured as the natural logarithm of market capitalization and market beta. The regression model is presented below:

$$V_i = \alpha + \beta_1(ESG_i) + \beta_2 ln(MktCap_i) + \beta_3(Beta_i) + \epsilon \quad (5)$$

Where:

V_i = Volatility (annual price variation of stock i from its average price)

α = Intercept term

ESG_i = ESG score for company i

$ln(MktCap_i)$ = Natural logarithm of market capitalization of company i

$Beta_i$ = Beta coefficient of company i

ϵ = Error Term

The third regression model explores the individual effects of the environmental (E), social (S), and governance (G) dimensions of the ESG score on stock price volatility. To isolate the explanatory power of each ESG pillar, three separate univariate regressions are estimated. This approach allows for a clearer interpretation of each dimension´s unique impact. The regression model is specified as follows:

$$V_i = \alpha + \beta_1(E_i) + \beta_2(S_i) + \beta_3(G_i) + \epsilon \quad (6)$$

Where:

V_i = Volatility (annual price variation of stock i from its average price)

α = Intercept term

E_i = Environmental score for the company i

S_i = Social score for company i

G_i = Governance score for the company i

ϵ = Error Term

The fourth regression model examines the relationship between ESG portfolio classification and stock price volatility. Companies are grouped annually into three ESG portfolios High, Neutral and Low, based on ESG score ranking. The model uses dummy variables for Neutral and Low portfolios, while the High portfolio serves as the baseline reference group. In addition, corresponding model is estimated using Beta as the dependent variable. This allows for a comparison of systematic risk levels across ESG portfolios. The regression equation is as follows:

$$V_i = \alpha + \beta_1 D_{neutral,i} + \beta_2 D_{low,i} + \epsilon \quad (7)$$

Where:

V_i = Volatility (annual price variation of stock i from its average price)

α = Intercept term (average volatility of High ESG group)

$D_{neutral,i}$ = Dummy variable for Neutral ESG portfolio

$D_{low,i}$ = Dummy variable for Low ESG portfolio

ϵ = Error Term

The fifth regression model explores the relationship between companies ESG score and their market sensitivity, measured by the beta coefficient. The model adds control for company size using the natural logarithm of market capitalization. This allows assessing whether ESG scores are associated with a firm's exposure to systematic market risk. The regression model is specified as follows:

$$\beta_i = \alpha + \beta_1 (ESG_i) + \beta_2 ln(MktCap_i) + \epsilon \quad (8)$$

Where:

β_i = Beta coefficient of company i (systematic market risk)

α = Intercept term

ESG_i = ESG score for company i

$ln(MktCap_i)$ = Natural logarithm of market capitalization of company i

ϵ = Error Term

These five regression models (4), (5), (6), (7) and (8) complement each other and provide a holistic view of the relationship between ESG scores and firm-level risk indicators. The models are used to examine how ESG performance is reflected both in the characteristics of individual companies and, more broadly, at the portfolio level.

5 Results

This chapter presents the empirical findings of the study. The results are divided into firm-level and portfolio-level analyses to capture the relationship between ESG performance and different dimensions of risk. The regressions examine both the overall ESG score and its individual components, Environmental (E), Social (S), and Governance (G), as well as the differences across ESG-based portfolios. The purpose of this section is to provide a systematic overview of the statistical outcomes that form the basis for the discussion in the following chapter.

5.1 Portfolio-level risk characteristics

Table 2 presents the portfolio-level summary statistics for companies divided into three ESG-score-based groups: High, Neutral and Low. Portfolios are constructed annually by ranking all firms based on their ESG score and splitting them into terciles. The top 33% of firms form the High ESG portfolio, the middle 34% the Neutral portfolio, and the bottom 33% the Low ESG portfolio. The table shows average values for stock price volatility, as a percentage, and beta for the High and Low ESG portfolios over the sample period 2014 – 2023.

The results suggest clear patterns in risk indicators across the ESG portfolios. Companies in the High ESG portfolio consistently exhibit lower average volatility and beta values than those in the Low ESG portfolio. For example, the volatility in the Low ESG group is notably higher in all years, with the gap exceeding 10 percentage points in some cases. Similarly, average beta values indicate greater sensitivity to market movements among the Low ESG firms.

These findings are in line with earlier research. Landi and Sciarelli (2019) and Alves et al. (2025) found no significant return differentials between ESG-based portfolios, but did not dismiss the role of ESG in risk perception. Studies such as Salama et al. (2011) and Sassen et al. (2016) have argued that stronger ESG profiles reduce systematic or total

risk, while Brammer et al. (2006) observed higher volatility among poorly rated firms. The portfolio-level evidence in this study supports the view that ESG characteristics may function as indicators of risk, even if their impact on returns remains ambiguous.

Table 2. Performance statistics of sample portfolios, average values.

	High		Low	
Year	Volatility (%)	Beta	Volatility (%)	Beta
2014	0.26	0.82	0.29	0.86
2015	0.25	0.76	0.38	1.20
2016	0.24	0.68	0.37	0.87
2017	0.22	0.77	0.42	0.73
2018	0.22	0.72	0.35	0.78
2019	0.21	0.67	0.33	0.48
2020	0.26	0.95	0.31	1.18
2021	0.25	1.43	0.33	1.52
2022	0.24	1.33	0.34	1.28
2023	0.23	1.15	0.31	1.16

5.2 Portfolio-Based Regression Analysis of ESG Scores and Risk Indicators

Table 3 reports the results from regressions estimating how portfolio membership, based on ESG score terciles, is associated with firm-level risk indicators: volatility and beta. High ESG portfolio serves as the reference group, and dummy variables are used to capture the relative differences for the Neutral and Low ESG groups.

The results show a clear and statistically significant relationship between ESG scores and volatility. Both the Neutral and Low ESG portfolios have higher average volatility compared to the High ESG portfolio. The coefficients are 0.058 ($p < 0.001$) for Neutral and 0.089 ($p < 0.001$) for Low, indicating a rising risk profile as ESG performance declines. The adjusted R^2 of 0.106 suggests that the model explains a modest but meaningful portion of the variation in volatility.

In contrast, the relationship between ESG scores and beta is not statistically significant. The coefficients for the Neutral and Low portfolios are 0.106 (p = 0.280) and 0.096 (p = 0.417), respectively. These findings suggest that ESG-based portfolio membership does not significantly explain differences in market sensitivity, although the direction of the coefficients aligns with expectations.

Overall, the regression results reinforce the earlier findings that ESG scores are more strongly related to firm-specific volatility than to market beta. This supports the notion that ESG characteristics may serve as indicators of idiosyncratic risk rather than systematic market exposure. These observations are consistent with prior findings by Brammer et al. (2006) and Sassen et al. (2016), as discussed in the literature review, which also emphasized ESG's stronger link to total or idiosyncratic risk rather than systematic beta.

Table 3. Regression analysis results for portfolio-level risk indicators

Dependent Variable	Portfolio	Coefficient	t-stat	p-value	Adj. R^2
Beta	Neutral	0.106	1.082	0.280	-0.002
	Low	0.096	0.813	0.417	
Volatility	Neutral	0.058	5.241	<0.001***	0.106
	Low	0.089	6.654	<0.001***	

The stars marked in the p-value context describe the level of statistical significance. One star (*) means that the p-value is less than 0.1, two stars (**) means less than 0.05, and three stars (***)

5.3 Firm-Level Regression Results

The first regression model examines the direct linear relationship between the overall ESG score and stock price volatility. As shown in Table 4, the model is based on 501 firm-year observations and estimates the extent to which sustainability performance, measured by ESG score, explains variation in firm-specific volatility.

The results indicate a statistically significant and negative relationship between ESG performance and volatility (β = -0.00203, p < 0.001). The coefficient implies that a one-point

increase in ESG score is associated with a 0.20 percentage point decrease in annual price fluctuation, on average. The model's explanatory power is moderate, with an adjusted R^2 of 0.151, indicating that approximately 15% of the variation in volatility is explained by differences in ESG performance.

These findings support the hypothesis that stronger ESG profiles are associated with lower firm-specific risk, and they align with several studies highlighted in the literature review. Salama et al. (2011) reported a negative association between environmental and community responsibility and systematic risk, suggesting that sustainability efforts reduce perceived risk by stabilizing cash flow expectations. Likewise, Sassen et al. (2016) found that high ESG scores were linked to reductions in both idiosyncratic and total risk across European firms. The present results are also in line with Horn (2023), who documented that ESG-rated firms in the U.S. exhibit lower idiosyncratic volatility, especially during periods of economic uncertainty.

The consistent and statistically strong result observed here underscores the notion that ESG scores can function as a risk-mitigating factor. Although the model does not include additional control variables, it establishes a clear foundation for understanding ESG's role in risk dynamics, which is further developed in subsequent multivariate analyses.

Table 4. Results of regression between ESG-Score and volatility

Dependent variable	Independent variable	Coefficient	Adjusted R	p-value	t-stat	n
Volatility	ESG-Score	-0.002	0.151	<0.001***	-9.494	501

The stars marked in the p-value context describe the level of statistical significance. One star (*) means that the p-value is less than 0.1, two stars (**) means less than 0.05, and three stars (***)

In the next step, a multivariate regression model was estimated to examine how ESG performance, firm size, and systematic risk jointly explain the variation in firm-level stock price volatility. Table 5 presents the results of this regression, where the dependent variable is volatility, and the independent variables are the ESG score, the natural logarithm of market capitalization, and beta.

All three explanatory variables are statistically significant at the 1% level, and the model explains approximately 40% of the variation in stock price volatility (Adjusted $R^2 = 0.400$). The ESG score has a negative and significant coefficient ($\beta = -0.00124$, $p < 0.001$), indicating that firms with better ESG performance tend to exhibit lower annual price fluctuations. This supports the hypothesis that ESG characteristics serve as indicators of idiosyncratic risk and are consistent with prior findings by Salama et al. (2011) and Sassen et al. (2016) who also reported that strong ESG profiles reduce both systematic and total firm-level risk. These results suggest that ESG performance contributes to corporate risk mitigation and may stabilize expected future cash flows.

The coefficient for ln(MktCap) is likewise negative and significant ($\beta = -0.01826$, $p < 0.001$), implying that larger firms experience lower volatility. Lastly, beta is positively and significantly related to volatility ($\beta = 0.04774$, $p < 0.001$), showing that firms with greater sensitivity to market movements also tend to display higher price variability.

Overall, the results provide robust evidence that ESG scores are inversely associated with firm-specific volatility, even after accounting for firm size and market risk exposure. This supports the broader view in the literature that ESG can function as a meaningful component of a firm's risk profile, particularly in the context of idiosyncratic risk. Studies by Horn (2023) and Zheng et al. (2025) similarly emphasized ESG's role in reducing volatility and enhancing corporate resilience, especially when integrated alongside traditional risk metrics.

Table 5. Regression results for ESG Score, firm size and beta

Dependent variable	Independent Variable	Coefficient (β)	Adjusted R^2	p-value	t-stat	n
Volatility	ESG-Score	-0.001	0.400	<0.001***	5.076476455	405
	ln(MktCap)	-0.018		<0.001***	5.804451808	
	Beta	0.048		<0.001***	9.645134701	

The stars marked in the p-value context describe the level of statistical significance. One star (*) means that the p-value is less than 0.1, two stars (**) means less than 0.05, and three stars (***)

means less than 0.01. The three-star marking indicates very strong statistical significance.

In the next stage, the impact of the individual ESG pillars: Environmental (E), Social (S), and Governance (G) on stock price volatility was assessed through separate linear regressions. Table 6 presents the results, each estimated using a sample of 396 firm-year observations. The results are presented side by side in Table 6 for ease of comparison. All three ESG components show a negative and statistically significant association. Among them, the environmental score exhibits the strongest explanatory power, with a coefficient of $\beta = -0.00178$ and an adjusted R^2 of 0.169. This suggests that companies with stronger environmental performance tend to experience lower stock price fluctuations. The social pillar also has a negative relationship ($\beta = -0.00138$, adjusted $R^2 = 0.086$), followed by governance ($\beta = -0.00116$, adjusted $R^2 = 0.063$), though the magnitude and explanatory power of these effects are weaker compared to the environmental score.

These findings align with previous literature. Sassen et al. (2016) found that E scores were significantly associated with reductions in idiosyncratic risk, while S-scores influenced all three risk indicators: systematic, idiosyncratic, and total risk. In contrast, their study found that G-scores had limited statistical significance, a result that is echoed in this analysis. Similarly, Horn (2023) concluded that ESG ratings reduce firm-specific risk, especially during volatile market periods, with environmental practices being particularly valued by investors. The consistent negative coefficients in this study reinforce the view that ESG subdimensions, especially environmental performance, may contribute to risk mitigation.

Overall, these results underline that ESG is not a uniform construct in its relationship to risk, and that the environmental dimension appears most influential in reducing firm-specific volatility.

Table 6. Univariate regression results of E, S and G-scores and volatility

Dependent Variable	Independent Variable	Coefficient (β)	Adjusted R^2	p-value	t-stat	n

Volatility	E Score	-0.00178	0.1693	<0.001	-9.03	396
	S Score	-0.00138	0.0863	<0.001	-6.19	396
	G Score	-0.00116	0.063	<0.001	-5.25	396

The stars marked in the p-value context describe the level of statistical significance. One star (*) means that the p-value is less than 0.1, two stars (**) means less than 0.05, and three stars (***) means less than 0.01. The three-star marking indicates very strong statistical significance.

To assess the relationship between ESG performance and systematic market risk, a linear regression model was estimated with Beta as the dependent variable, and ESG score and the natural logarithm of market capitalization as explanatory variables. The regression results are reported in Table 7.

The findings show that both explanatory variables are statistically significant at the 5% level. Interestingly, the ESG score exhibits a positive and significant association with beta ($\beta = 0.00556$, $p = 0.027$), suggesting that firms with higher ESG scores may be slightly more sensitive to market-wide fluctuations. On the other hand, firm size is negatively associated with beta ($\beta = -0.1639$, $p < 0.001$), which is in line with the expectation that larger companies tend to have more diversified operations and lower exposure to market risk.

Despite the statistical significance of both predictors, the adjusted R^2 is relatively low (0.064), indicating that ESG performance and firm size together explain only about 6% of the variation in beta across firms. This result highlights a key distinction in the analysis: while ESG scores are consistently associated with lower idiosyncratic risk, their explanatory power regarding systematic risk remains limited.

These results align with the conclusions drawn by Landi and Sciarelli (2019) and Alves et al. (2025), who found that ESG performance is not a strong predictor of systematic return behavior. It also reinforces the overall conclusion of this study that ESG is more closely tied to firm-specific volatility than to market sensitivity.

Table 7. Regression results for ESG-Score and firm size on market beta

Dependent Variable	Independent Variable	Coefficient (B)	Adjusted R	p-value	t-stat	n
Beta	ESG-Score	0.006	0.064	0.027*	2.218	396
	ln(MktCap)	-0.164		<0.001***	-5.319	

The stars marked in the p-value context describe the level of statistical significance. One star (*) means that the p-value is less than 0.1, two stars (**) means less than 0.05, and three stars (***) means less than 0.01. The three-star marking indicates very strong statistical significance.

6 Conclusion and Discussion

The aim of the study was to examine how ESG scoring is reflected in equity risk of Norwegian listed companies. The risk perspective was assessed using two indicators: the annual volatility of the share price and systematic risk. Based on the results, ESG scores are clearly linked to firm-level risk, but the nature of the effect depends on whether the risk is measured through volatility or beta.

Regression results at the firm level showed that higher ESG scores are consistently associated with lower stock price volatility. This relationship remained significant even when control variables such as firm size and beta were added to the model. In addition, when ESG was decomposed into its E, S, and G pillars, it was found that the environmental dimension (E) in particular was most strongly associated with a decrease in risk. The social and governance dimensions also showed a negative, albeit weaker, association with volatility. The results support previous findings that a strong ESG profile can serve as a risk management tool. For example, Sassen et al. (2016), Salama et al. (2011), and Horn (2023) have reported similar links between ESG performance and risk. These findings provide strong evidence against the null hypothesis (H_0) and support the first alternative hypothesis (H_1), according to which ESG performance has a positive effect on firm-level risk by reducing stock price volatility.

A portfolio-level analysis supported the firm-level findings. The ESG portfolios formed annually showed that companies with the lowest ESG scores were, on average, more volatile and had higher beta values than those with the highest ESG scores. The regression models showed a statistically significant difference, especially in volatility. Differences in beta were not statistically significant, although the direction of the relationship was consistent.

On the other hand, the results showed that ESG scores were slightly positively associated with beta, indicating that companies with higher ESG ratings may have slightly higher

sensitivity to market fluctuations. This association was statistically significant but weak, and it did not alter the conclusion that the impact of ESG is primarily manifested in idiosyncratic, firm-specific risk rather than in systematic market risk. Thus, the results support the view that ESG primarily acts as a stabilizing factor in managing a company's internal risk profile, rather than as a hedge against market-wide volatility. This is also consistent with the findings of Landi and Sciarelli (2019) and Alves et al. (2025), who concluded that ESG is not a systematic explainer of return behavior or beta. While the relationship between ESG scores and beta was positive but weak, it does not provide support for H_2, which anticipated a risk-increasing effect of ESG.

The study also highlights that ESG is not an unambiguous construct. The effects of its different dimensions vary, and the importance of environmental factors in particular is emphasized in the context of risk management. This observation supports an approach in which ESG is analyzed not only as a combined aggregate index, but also at the level of its individual components. Moreover, the consistency of findings across multiple models, both at the firm level and the portfolio level, enhances the credibility of the results.

Overall, the findings of this study support the theory that ESG performance functions as a risk signal from the investor's perspective. Although its impact on returns remains unclear, as noted in previous literature, ESG provides meaningful information from a risk standpoint that can support investment decision-making. Overall, the results are consistent with H_1 and lead to the rejection of H_0, whereas H_2 is not supported by the empirical data.

6.1 Limitations and suggestions for future research

This study has some key limitations that are important to consider when interpreting the results. Firstly, the data covers only Norwegian listed companies, which limits the generalizability of the findings to other markets. The Norwegian market is characterized by a strong energy- and shipping-oriented industrial structure and relatively high ESG reporting standards, which may influence the observed associations. Therefore, the results

cannot be directly generalized to, for example, smaller emerging markets or other Nordic countries without further analysis.

Secondly, the study focuses exclusively on the risk aspect, leaving questions related to returns as secondary. In addition, the models do not include industry-specific fixed effects or other structural control variables that could further explain the observed differences in risk. This may limit the models' ability to isolate the impact of ESG from other firm-specific factors.

Third, ESG metrics are based on third-party scoring, which may involve methodological differences and varying weightings. The overall score used in the study, as well as the E, S, and G dimensions, are based on a specific definition whose transparency is limited. As a result, the findings are dependent on the data provider used and may differ when using other ESG rating sources.

In future research, it would be advisable to extend the analysis to include data from multiple countries, in order to compare the relationship between ESG and risk across market boundaries. In addition, it would be useful to examine industry-specific effects or to analyze small-cap and large-cap companies separately, as the impact of ESG may vary depending on firm size and sector. The use of longitudinal data and the assessment of causality, for example, through instrumental variable techniques, could also strengthen the interpretation of the observed associations.

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