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The Influence of ESG Performance on Financial Returns in European Mining Companies

Evidence from 2015–2025

Accounting and Finance
Bachelor's thesis

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This thesis investigates the relationship between Environmental, Social, and Governance (ESG) performance and financial returns in publicly listed European mining companies. While ESG has become increasingly more important in investment decision-making, particularly in high-impact sectors like mining, there remains limited empirical evidence on its financial implications within the European context. Using annual ESG scores and stock return data from Bloomberg covering the period 2015 to 2025, this study employs a panel regression model with STOXX 600 as the market benchmark.

The results indicate no statistically significant relationship between overall ESG scores and stock returns. Correlation analysis and a comparison of high- and low-ESG firms similarly reveal no meaningful differences in financial performance. However, firms that improved their ESG scores over time achieved notably higher average returns than those with stagnant or declining ESG performance, suggesting that ESG momentum may be more financially relevant than absolute ESG levels.

These findings contribute to the ongoing discussion about the financial materiality of ESG, especially in environmentally sensitive industries. While ESG performance alone does not appear to guarantee superior short-term returns in the mining sector, changes in ESG practices may carry signals of strategic improvement with long-term implications.

Key words: Environmental, Social and Governance (ESG), financial performance, mining industry, stock returns, sustainability, Bloomberg ESG scores, European Union

Kandidutkielma

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Tämä kandidaatintutkielma tarkastelee ympäristöön, sosiaaliseen vastuuseen ja hallintotapaan (ESG) liittyvän suorituskyvyn ja taloudellisen tuoton välistä yhteyttä eurooppalaisten pörssinoteerattujen kaivosyhtiöiden osalta. ESG-teemojen merkitys sijoituspäätöksissä on kasvanut erityisesti ympäristöriskialttiilla toimialoilla, kuten kaivosteollisuudessa, mutta empiiristä tutkimusta niiden taloudellisista vaikutuksista Euroopassa on yhä rajallisesti saatavilla. Tutkielma hyödyntää Bloombergin vuosittaista ESG-pisteytystä sekä osaketuotodataa vuosilta 2015–2025. Analyysi perustuu paneeliregressiomalliin, jossa STOXX 600 -indeksi toimii markkinareferenssinä.

Tulosten perusteella ESG-pisteytyksen ja osaketuottojen välillä ei havaita tilastollisesti merkitsevää yhteyttä. Myöskään korrelaatioanalyysi tai vertailu korkean ja matalan ESG-pisteytyksen omaavien yritysten välillä ei tuo esiin merkittäviä eroja taloudellisessa suorituskyvyssä. Sen sijaan yhtiöt, joiden ESG-pisteet paranivat tarkastelujakson aikana, saavuttivat keskimäärin selvästi korkeampia tuottoja kuin ne, joiden pisteytys pysyi ennallaan tai heikkeni.

Tulokset viittaavat siihen, että ESG-suorituskyvyn kehitys ajan myötä voi olla taloudellisesti merkittävämpi tekijä kuin pisteytyksen hetkellinen taso. Tutkimus tarjoaa lisänäyttöä ESG-suorituskyvyn taloudellisesta merkityksestä erityisesti korkean ympäristöriskin toimialoilla. Vaikka ESG-taso ei yksin ennusta lyhyen aikavälin tuottoja kaivosalalla, pisteytyksen paraneminen voi toimia signaalina strategisesta kehityksestä ja pitkän aikavälin potentiaalista.

Avainsanat: ESG, taloudellinen suorituskyky, kaivosteollisuus, osaketuotot, kestävä kehitys, Bloomberg ESG -pisteet, Euroopan unioni

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1 INTRODUCTION

1.1 Background and motivation

Environmental, Social, and Governance (ESG) considerations have become increasingly more relevant in financial markets, shaping investment decisions and corporate strategies. ESG factors aim to measure a company's impact on sustainability, ethical governance, and stakeholder relations, providing investors with a framework to assess non-financial risks that could influence long-term financial performance. The importance of ESG has grown significantly in recent years, with a 2022 study by Rodríguez-Rojas et al. highlighting that annual publications on Sustainable Finance in Web of Science have increased by nearly 60% over the past five years.

The mining industry holds a paradoxical role in sustainability efforts. On one hand, mining is essential for producing materials needed in renewable energy infrastructure and electric vehicle production, thereby supporting the transition to a low-carbon economy (Vikström et al., 2013). On the other hand, mining operations are associated with significant environmental degradation, carbon emissions, and social conflicts, raising concerns about the sector's long-term sustainability (Azapagic, 2004).

In this context, the growing emphasis on ESG performance has placed increasing pressure on European mining companies to reconcile economic objectives with sustainability expectations. Despite this, there is still a notable lack of research focused specifically on the relationship between ESG performance and financial returns in the European mining sector. This thesis addresses this gap by exploring whether ESG scores can serve as a meaningful indicator of financial performance among publicly listed European mining firms.

1.2 Research objectives and research questions

The primary objective of this thesis is to examine whether a company's ESG score correlates with its financial performance in publicly listed European mining companies. Given the environmental and social controversies surrounding mining operations, it is critical to assess whether higher ESG ratings contribute to better stock returns or if sustainability efforts come at a financial trade-off.

This study aims to answer the following research questions: does a higher ESG score correlate with better financial performance in publicly listed European mining

companies, and what are the main conflicts between ESG policies and financial objectives in the mining sector. By addressing these questions, the thesis contributes to the ongoing academic discussion on the financial relevance of ESG factors, particularly within environmentally sensitive industries. The findings may provide valuable insights for investors, policymakers, and corporate leaders in understanding how ESG performance influences financial returns.

1.3 Structure of the thesis

This thesis analyzes the impact of ESG performance on financial outcomes in the European mining sector. The second chapter provides a literature review, summarizing theoretical perspectives on ESG and financial performance, ESG factors in the mining industry, and regulatory developments such as the Corporate Sustainability Reporting Directive (CSRD) and EU Taxonomy. The third chapter outlines the methodology, describing the dataset, regression model specifications, and analytical techniques used to evaluate ESG's financial impact. The fourth chapter presents the empirical results and discussion, including descriptive statistics and regression findings. The final chapter concludes the study, summarizing key findings, discussing implications for investors and mining companies, and suggesting avenues for future research.

2 ESG AND FINANCIAL PERFORMANCE

2.1 Environmental, social and governance

ESG as a concept and symbol is very broad and almost impossible to fit under one set of rules, but the factors themselves can be explained rather unambiguously. Environmental factors evaluate how a company affects the natural environment and how dedicated it is to sustainable practices. Key considerations include the efficient use of resources such as energy and water, responsible management of pollution and waste, and efforts to protect biodiversity (Ahmad et al., 2024). Social factors focus on a company's relationships with its customers, employees, suppliers, and the wider community. This dimension of ESG encompasses labour practices, health and safety standards, diversity and inclusion efforts, and community engagement initiatives. Companies with strong social practices prioritize fair wages, safe working conditions, and respect for human rights while also fostering inclusive workplaces that value diversity (Jin, 2023). Governance factors refer to the internal rules, procedures, and oversight mechanisms that shape how a company operates and makes decisions. This includes the composition and diversity of the board of directors, shareholder rights, executive compensation, transparency in reporting, and adherence to ethical business practices (De Souza Barbosa et al., 2023).

Table 1. ESG Dimensions explained

ESG Dimension	Definition	Key Factors	Example Considerations
Environmental	Evaluates company's effect on the natural environment and how dedicated it is to sustainable practices	Resource efficiency, pollution control, biodiversity protection.	Energy & water usage, carbon emissions, waste management.
Social	Assesses how a company interacts with its stakeholders, such as employees, customers, and local communities.	Labor rights, health & safety, diversity, community engagement.	Fair wages, workplace safety, human rights policies.
Governance	Examines internal policies, controls, and ethical decision-making.	Board diversity, executive pay, transparency, shareholder rights.	Independent board, ethical business conduct, financial disclosure.

2.1.1 Impact of ESG factors

The impact of ESG factors is evident in the growing effort by companies to incorporate ESG considerations into their operations, recognizing that strong ESG performance can enhance corporate financial performance. This integration is often driven by the need to align with stakeholder expectations and regulatory requirements (Jin, 2023).

When it comes to stakeholders, including investors, employees, customers, and communities, they exert considerable pressure on firms to adopt sustainable practices. Research indicates that such pressures significantly influence companies' sustainability disclosure performance, prompting them to be more transparent about their ESG activities (Alessa et al., 2024).

Governments play a crucial role in shaping ESG practices through legislation and regulation. For instance, regulatory bodies are increasingly scrutinizing ESG claims to combat greenwashing, ensuring that companies' sustainability claims are accurate and verifiable. This regulatory environment compels companies to adhere to stricter ESG standards and reporting practices (Ahmad et al., 2024). In Europe the Corporate Sustainability Reporting Directive (CSRD) and EU Taxonomy are good examples of regulation that force companies to pay even more attention to ESG factors.

2.1.2 Challenges for ESG

Although ESG has seen significant growth over the past decade, particularly following the Paris Agreement in 2015, it has not been without its challenges. Most recently, the re-election of Donald Trump as President of the United States has influenced corporate ESG commitments, as political shifts impact regulatory landscapes and investor priorities. Several major public companies have reassessed or even abandoned their ESG targets in response to these changes. For example, Wells Fargo recently withdrew its net-zero emissions target, citing uncertainties in policy and technological advancements (Reuters, 2025).

Similarly, asset managers like BlackRock and Deutsche Bank have reduced new ESG fund launches, reflecting concerns over financial viability and regulatory complexity. Meanwhile, corporations such as Amazon and Walmart have cut back on Diversity, Equity, and Inclusion (DEI) initiatives, highlighting broader skepticism about ESG's long-term profitability (Eco-Business, 2025).

These developments illustrate how political and economic factors can create both

uncertainty and resistance in the ESG movement, highlighting the ongoing tension between corporate profitability and sustainability commitments.

2.2 ESG and European mining companies

In this politically sensitive time mining becomes even more of a crucial industry for Europe. Mining and processing of raw materials are fundamental to all industrial value chains, providing essential inputs for the production of goods (Mancini & Sala, 2018; Simkova et al., 2022). While the future becomes more and more unpredictable as global trade relations change faster than ever before, securing a source of material for necessary infrastructure and products, while not forgetting military industry, gives a lot of needed security and negotiation power to Europe.

2.2.1 Mining as a part of European economy

The mining industry is closely linked to the economic cycles of EU countries, influencing GDP and employment rates. It is a significant contributor to national and regional economies (Gavurová et al., 2017). The mining industry does not only work as a source of materials for other industries it also creates a lot of job opportunities which may contribute to improved living standards. Mining activities can also lead to the development of infrastructure, public health services, and education, which are crucial for community development (Hosseinpour et al., 2022). The mining industry can have a positive impact when we look at the economic and social aspects. When it comes to the environment, the mining industry is known to be quite a controversial topic.

2.2.2 Mining and ESG factors

The mining industry is a crucial supplier of raw materials for modern technologies, including batteries for electric vehicles and renewable energy infrastructure (Vikström et al., 2013). These applications represent a clear positive contribution to the environmental dimension of ESG by enabling cleaner energy systems. However, mining operations also pose significant environmental and social risks, raising concerns about their overall sustainability (Azapagic, 2004).

Environmentally, large-scale open-pit and underground mining activities contribute to land degradation, water contamination, air pollution, and biodiversity loss. Land disruption from mining operations often leads to deforestation, erosion, and habitat

destruction. For example, research shows that for every 393 million tons of open-pit mining, over 900 hectares of land are impacted by waste dumps and tailings dams (Moradi & Osanloo, 2015). These disruptions can result in irreversible ecological damage.

Water pollution is also a critical concern, particularly through acid mine drainage, which occurs when sulfide minerals are exposed to air and water, releasing toxic substances such as arsenic, mercury, and lead (Hosseinpour et al., 2022). These substances can pollute surface and groundwater sources, posing long-term risks to human health and aquatic ecosystems. In addition, tailings dam failures have caused severe environmental disasters, intensifying mining's impact on water resources (Lottermoser, 2009).

The climate-related impacts of mining are equally significant. Mining operations, especially coal extraction, contribute to greenhouse gas emissions, including substantial methane (CH₄) releases. Methane from coal mining alone is estimated to account for around 1% of total global emissions (Mohsin et al., 2021). A satellite-based study of six coal mines in Queensland, Australia, found that they emitted approximately 570 gigagrams of methane annually between 2018 and 2019 (Sadavarte et al., 2021). These findings emphasize mining's role in atmospheric pollution and global warming.

From a social ESG perspective, mining can offer economic benefits such as employment and infrastructure investment. However, these often come at a cost. Mining projects frequently cause community displacement, heighten health risks, and generate local tensions. A study on small-scale mining in Serbia and Bosnia & Herzegovina reported negative effects such as environmental degradation, social conflict, and health problems among affected communities (Sydd et al., 2022). Similarly, research from Jordan highlights widespread concern over displacement, pollution, and health impacts among residents living near mining operations (Al Rawashdeh et al., 2016).

In summary, while mining supports sustainable technologies, it simultaneously poses challenges to environmental and social sustainability. These conflicting effects underscore the complex ESG profile of the mining industry and highlight the importance of comprehensive ESG measurement and risk mitigation in the sector.

Table 2. Positive and negative effects of mining

	Positive Effect	Negative Effect
Economic	Job creation, Infrastructure development, Economic growth	Economic instability in some cases, Displacement of communities
Environmental	Sustainable landscape management, Water extraction	Land disturbance, Pollution (air, water, soil), Biodiversity loss
Social	Improved public services (health, education), Enhanced quality of life	Health risks, Social disruption

2.3 European Union's regulatory framework

In the European Union, two key regulations, the Corporate Sustainability Reporting Directive (CSRD) and the EU Taxonomy for Sustainable Activities, play a crucial role in shaping how companies, including those in the mining sector, report on and align with sustainability objectives. These frameworks aim to enhance transparency, improve investment decision-making, and drive the transition toward a more sustainable economy.

The CSRD is an EU directive that requires companies to disclose information on their ESG performance. The directive seeks to improve the comparability, consistency, and reliability of corporate sustainability reporting, making it easier for investors and stakeholders to assess a company's environmental and social impact. Companies covered by the CSRD must adhere to the European Sustainability Reporting Standards (ESRS), which were established by the European Financial Reporting Advisory Group (EFRAG). The directive applies to large EU-based companies and listed small and medium-sized enterprises (SMEs), with the first reporting cycle starting for the 2024 financial year, requiring reports to be published in 2025 (European Commission, 2025).

The EU Taxonomy for Sustainable Activities is a classification system that specifies which economic activities are considered environmentally sustainable. The taxonomy is designed to prevent greenwashing, direct private investments toward sustainable initiatives, and support the EU's climate and energy targets for 2030 and the European Green Deal (European Commission, 2025). To be classified as sustainable, an activity must substantially contribute to at least one of six environmental objectives while ensuring that it does not cause significant harm to any of the others. The six objectives include

- Climate change mitigation
- Climate change adaptation
- Sustainable use and protection of water and marine resources
- Transition to a circular economy
- Pollution prevention and control
- Protection and restoration of biodiversity and ecosystems

The mining industry, given its substantial environmental footprint, is directly influenced by these regulations. Under the CSRD, mining companies operating in the EU are obligated to report on their ESG impacts, including greenhouse gas emissions, land degradation, and water pollution. This increased transparency allows stakeholders, regulators, and investors to evaluate the sustainability performance of mining companies and hold them accountable for their environmental and social impact.

Simultaneously, the EU Taxonomy establishes criteria for assessing whether mining activities align with environmental sustainability goals. Mining operations that adopt low-impact extraction techniques, circular economy principles, and pollution control measures may qualify as sustainable under the taxonomy, making them more attractive to environmentally conscious investors and financial institutions. Conversely, companies failing to meet the EU's sustainability criteria may face difficulties accessing investment capital, pushing the industry toward greener and more responsible mining practices.

Table 3. CSRD and EU Taxonomy explained

	Corporate Sustainability Reporting Directive (CSRD)	EU Taxonomy for Sustainable Activities
Purpose	Improves transparency by requiring companies to report on sustainability impacts.	Defines what economic activities are considered environmentally sustainable.
Who It Affects	Large companies (250+ employees) and listed SMEs in the EU.	Investors, financial institutions, and businesses engaging in sustainable finance.
Key Requirements	Companies must report ESG impacts under the European Sustainability Reporting Standards (ESRS).	Activities must contribute to at least one of six environmental objectives without harming others.
Impact on Mining	Mining companies must disclose carbon emissions, resource usage, and social risks.	Determines if mining activities meet sustainability criteria and qualify for green investment.
Challenges	High compliance costs, complexity in ESG data collection.	Strict criteria may limit certain activities from being classified as sustainable.

2.3.1 Recent EU regulatory developments and proposed amendments to sustainability directives

As the European Union continues refining its sustainability regulatory framework, recent legislative proposals seek to balance corporate sustainability transparency with reducing administrative burdens on businesses. One such development is the Proposal for a Directive of the European Parliament and of the Council (COM(2025) 81 final), which introduces amendments to Directives 2006/43/EC, 2013/34/EU, (EU) 2022/2464, and (EU) 2024/1760. These proposed changes have significant implications for corporate sustainability reporting, particularly for industries with high environmental and social impacts, such as mining.

The proposed directive seeks to adjust sustainability reporting obligations under the CSRD and the Corporate Sustainability Due Diligence Directive (CSDDD). The main objectives of these amendments are

- Reducing the scope of mandatory sustainability reporting by exempting certain large undertakings with fewer than 1,000 employees from CSRD requirements.

- Delaying implementation deadlines for some reporting obligations, allowing businesses more time to comply with sustainability disclosure requirements.
- Introducing voluntary sustainability reporting standards for SMEs, thereby reducing trickle-down reporting burdens on smaller firms within supply chains.

The mining sector, which faces high regulatory scrutiny due to its environmental and social footprint, will be directly impacted by these revisions. Under the original CSRD framework, mining companies operating in the EU were required to disclose extensive ESG-related data, including information on carbon emissions, biodiversity impact, resource consumption, and social risks. The proposed amendments may ease compliance burdens for mid-sized mining firms while maintaining stringent transparency requirements for larger corporations. However, the exclusion of certain companies from mandatory reporting may raise concerns about data gaps in sustainability assessments and investor decision-making.

This proposal reflects the evolving regulatory landscape affecting European mining companies. The balance between regulatory compliance, financial performance, and sustainability objectives is central to understanding ESG's role in corporate strategy. While increased transparency enhances investor confidence and corporate accountability, the administrative and financial costs of compliance remain a challenge for businesses. These proposed amendments underscore the complexity of ESG regulation and reinforce the need to examine how governance structures and policy changes influence financial outcomes in the mining sector.

2.4 ESG and financial performance

The relationship between ESG factors and financial performance has been widely studied in finance and sustainability literature. Several theories attempt to explain the mechanisms through which ESG factors impact corporate financial performance (CFP). The Stakeholder Theory (Freeman, 1984) suggests that companies engaging in ESG initiatives foster stronger relationships with key stakeholders, reducing risks related to regulatory scrutiny, reputational damage, and consumer trust. This improved stakeholder engagement is expected to translate into long-term financial benefits. Conversely, the Shareholder Value Theory (Friedman, 1970) argues that a firm's primary obligation is to maximize shareholder value, and excessive focus on ESG may divert resources from

profit-generating activities, potentially harming financial performance.

A complementary perspective is provided by the Risk Management Theory, which posits that firms with strong ESG practices are better equipped to handle operational and reputational risks. By reducing exposure to environmental liabilities, social controversies, and governance failures, these firms can achieve lower cost of capital and improved financial stability (Friede, Busch, & Bassen, 2015). Furthermore, Harrison and Freeman (1999) discuss the broader role of stakeholder management in corporate social responsibility, emphasizing how firms that effectively balance competing stakeholder interests can achieve sustainable financial success.

2.4.1 Risk mitigation and cost of capital reduction

Firms with strong ESG performance often benefit from lower capital costs and reduced financial risk. Research by Bruna et al. (2022) found that firms demonstrating high ESG engagement experienced reduced financial volatility and greater investor confidence. Similarly, studies suggest that higher ESG transparency reduces information asymmetry between firms and investors, which can lead to lower equity and debt financing costs (Brooks & Oikonomou, 2018).

2.4.2 ESG as a competitive advantage

The stakeholder theory suggests that firms engaging in ESG practices develop stronger relationships with employees, customers, and investors, which can lead to higher profitability and firm value. Studies by Li et al. (2018) found that companies with superior ESG disclosure experienced higher firm value, as they were perceived as more transparent and accountable. Furthermore, companies with proactive ESG strategies tend to attract and retain better talent, improving long-term operational efficiency (Li et al., 2018).

2.4.3 Empirical evidence on ESG-CFP relationship

Empirical research on the ESG-financial performance relationship has produced mixed results. A meta-analysis by Friede, Busch, and Bassen (2015), aggregating more than 2,000 empirical studies, found that approximately 90% of the studies reported a non-negative relationship between ESG and financial performance, with the majority indicating a positive correlation. These findings suggest that firms investing in ESG practices tend to benefit financially, whether through enhanced investor confidence,

reduced risk exposure, or improved operational efficiency.

Further studies have examined how different ESG components contribute to financial outcomes. Some research indicates that governance factors play the most significant role in financial stability, while environmental and social factors can have both positive and negative effects depending on industry-specific risks and regulations (Li et al., 2018).

Additionally, evidence suggests that the ESG-CFP relationship is not necessarily linear. Xie et al. (2019) found that firms with moderate levels of ESG disclosure experienced the highest financial benefits, whereas firms with low or excessively high ESG disclosure saw weaker returns. This implies that beyond a certain threshold, ESG spending may have diminishing financial returns.

2.4.4 Sector-specific ESG impact

The impact of ESG on financial performance is not consistent across industries. In low-impact industries such as technology or financial services, ESG adoption is often seen as a strategic choice to attract investors. However, in high-impact industries such as mining, oil, and gas, ESG integration is often driven by regulatory requirements and risk mitigation rather than competitive advantage (Olli, 2021). Research indicates that while ESG positively correlates with financial performance in non-sensitive industries, its effect in environmentally sensitive sectors is more complex. Companies operating in these industries must balance sustainability initiatives with cost-intensive compliance measures, which can sometimes offset ESG-driven financial gains.

Despite these challenges, several studies have shown that mining firms with strong ESG practices tend to experience lower financial volatility, better investor sentiment, and reduced regulatory penalties (Makridou et al., 2023). This suggests that while the financial benefits of ESG in the mining sector may not always be immediate, they manifest over time through improved risk management and long-term strategic positioning.

2.4.5 Challenges and conflicting findings

Despite the strong evidence supporting ESG's financial benefits, conflicting findings remain. Some studies suggest that ESG investments impose additional costs that may not always translate into immediate financial gains. The agency cost theory argues that

managers may partake in ESG initiatives for personal reputation benefits rather than shareholder value, leading to inefficiencies (Li et al., 2018). Additionally, reverse causality concerns exist, where financially successful firms may simply have more resources to invest in ESG, rather than ESG itself driving financial success (Brooks & Oikonomou, 2018).

2.4.6 Conclusion

The relationship between ESG and financial performance is complex and varies across industries and ESG dimensions. While empirical evidence suggests a generally positive or non-negative relationship, sector-specific challenges, regulatory environments, and governance structures play a crucial role in determining ESG's financial impact. For European mining companies, ESG considerations are particularly relevant due to increasing regulatory scrutiny and investor expectations. Understanding how ESG affects financial performance in this sector is essential for policymakers, investors, and corporate leaders seeking to balance sustainability goals with profitability objectives.

2.5 ESG and mining companies' financial performance

The mining industry is uniquely positioned within the ESG framework due to its significant environmental footprint, complex social dynamics, and governance challenges. While ESG integration is increasingly recognized as a driver of financial performance, the extent to which each ESG component impacts financial outcomes in mining remains an area of active research.

Mining operations are resource-intensive and pose serious environmental and social risks, including carbon emissions, water contamination, biodiversity loss, and labor rights issues. However, mining companies are also essential to the global transition toward a low-carbon economy, supplying critical minerals for renewable energy technologies and electric vehicles (Ivic et al., 2021). ESG factors play a dual role in the industry, both as risks to be mitigated and as opportunities for competitive advantage.

2.5.1 Environmental factors and financial performance

The environmental dimension of ESG is particularly significant in the mining industry due to its inherent impact on ecosystems and climate change. Research suggests that

strong environmental performance can lead to lower financial risk and improved stock performance. For example, companies that implement carbon reduction strategies, energy efficiency measures, and responsible waste management tend to have better investor confidence and long-term financial stability (Fu et al., 2024).

However, some studies indicate a negative relationship between environmental responsibility and profitability. Makridou et al. (2023) found that while social and governance factors had a neutral to positive financial impact, environmental investments in European energy and mining firms negatively affected short-term profitability, likely due to high upfront costs and regulatory compliance expenses. Similarly, research on U.S. mining firms suggests that while strong environmental compliance reduces financial risk, it does not necessarily enhance short-term stock returns (Jin, 2023).

2.5.2 Social factors and financial performance

The social component of ESG in mining relates to community relations, labor practices, workplace safety, and local economic development. Mining companies that engage with local communities and maintain strong labor relations tend to experience fewer regulatory fines, production disruptions, and social license to operate issues (Sydd et al., 2022).

A study analysing European mining firms found that social sustainability initiatives, such as local employment programs, community investments, and improved worker safety standards, were associated with lower operational risk and better long-term financial performance (Ivic et al., 2021). However, in some cases, companies with poor social track records but strong financial resources continue to operate profitably, particularly in jurisdictions with weak enforcement of labour and human rights laws (Makridou et al., 2023).

2.5.3 Governance factors and financial performance

Corporate governance, including board composition, executive compensation, shareholder rights, and transparency, is a key determinant of financial success in mining companies.

For example, research by Fu et al. (2024) demonstrated that mining firms with higher ESG ratings, particularly in governance, had significantly lower financial risk exposure. Additionally, governance plays a crucial role in mitigating risks associated with

corruption, regulatory compliance, and shareholder disputes, which are particularly prevalent in resource-dependent economies (Ivic et al., 2021).

2.5.4 The interaction of ESG dimensions

Interestingly, the relationship between ESG and financial performance varies across the three individual dimensions. Some studies suggest that strong governance enhances the financial benefits of environmental and social initiatives, acting as a risk-mitigating factor (Makridou et al., 2023). Conversely, in industries like mining, where environmental compliance costs are high, environmental improvements may reduce profitability unless coupled with strong governance and strategic cost management (Jin, 2023).

A case study on U.S. mining companies found that while high ESG performers outperformed low ESG performers in stock excess returns, this was largely driven by governance and social factors rather than environmental responsibility (Jin, 2023). This suggests that investors may prioritize governance and social stability over strict environmental compliance when assessing financial viability.

2.5.5 Conclusion

The financial impact of ESG in the mining sector is multifaceted and varies based on regulatory frameworks, market expectations, and operational strategies. While governance and social factors generally correlate positively with financial performance, environmental initiatives often require longer time horizons to yield financial benefits. For European mining companies, balancing sustainability efforts with financial objectives remains a challenge, necessitating a strategic approach to ESG integration.

3 DATA AND METHODOLOGY

3.1 Data description

The initial aim of this study was to analyse how different ESG factors individually contribute to CFP in publicly listed European mining companies. However, due to data limitations, the analysis focuses on overall ESG scores, as disaggregated data on environmental, social, and governance components is inconsistently reported across firms.

The dataset consists of annual ESG scores and stock price data for European mining companies obtained from Bloomberg. The sample spans from December 2015 to early 2025, with ESG score coverage gradually improving over time. At the beginning of the period, data is available for 12 companies, rising to 13 by September 2021, and 24 from December 2021 onward. This variation in coverage introduces challenges in constructing a balanced panel for firm-level analysis.

To ensure consistency across companies operating in different currencies, stock prices were converted into annual percentage returns. Broader market movements were accounted for using the STOXX 600 index, which serves as a benchmark for European equity market performance.

Despite these adjustments, it is important to acknowledge that data availability remains a constraint. ESG scores are only published annually, and not all firms report consistently. As a result, the final dataset includes 143 firm-year observations where both ESG and return data are available. While sufficient for exploratory purposes, the relatively small sample size limits the use of more advanced econometric techniques and reduces the generalizability of the findings.

3.1.1 Overview of Bloomberg ESG scores

Bloomberg ESG scores assess how effectively a company manages ESG issues that are financially material, emphasizing the ESG factors that influence its financial performance. These scores are designed to help investors, regulators, and other stakeholders assess how well a company manages sustainability risks and opportunities (Bloomberg, 2023).

Financial materiality in this context refers to ESG issues that can influence a company's revenue, operating costs, cost of capital, asset value, and liabilities.

Bloomberg determines material ESG factors using proprietary research, incorporating probability, magnitude, and timing assessments of ESG-related financial risks.

Bloomberg ESG score uses quantitative, materiality-focused, and transparent approach. The scoring system is based entirely on publicly available, company-disclosed data, avoiding subjective analyst estimates. This ensures that scores are updated promptly as new corporate reports become available.

Companies usually receive individual E, S, and G pillar scores, which are then aggregated into an overall ESG score. Each ESG pillar is broken down into sub-issues and field-level scores, which are weighted based on financial materiality. The final overall ESG score ranges from 0 to 10, with higher scores indicating stronger ESG management.

3.2 Stock return data and market benchmark

Stock price data for publicly listed European mining companies was obtained from Bloomberg. Since stock prices are reported in different currencies, raw price data was transformed into annual percentage returns to ensure comparability. This conversion eliminates currency effects and allows for a standardized analysis across companies operating in different financial environments. Annual stock returns were calculated using the following formula

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

where $R_{i,t}$ represents the annual return for company i in year t , $P_{i,t}$ is the last available stock price for the company at the end of year t , and $P_{i,t-1}$ is the price at the end of the previous year. By using end-of-year prices, this approach captures stock performance consistently across all firms in the dataset.

To account for overall market movements, the STOXX 600 index was selected as a benchmark for European stock performance. The STOXX 600 is a broad-based index representing 600 large, mid, and small-cap companies across 17 European countries (Badea et al., 2019), making it an appropriate control variable for analyzing the relative performance of mining companies. Annual percentage returns for the STOXX 600 were calculated using the same methodology as individual stock returns.

The inclusion of a market benchmark is essential to distinguish company-specific ESG effects from broader market trends. If ESG scores have a significant impact on stock

returns after controlling for market movements, this would suggest that ESG factors play a role beyond macroeconomic and industry-wide fluctuations.

3.3 Regression model

To assess the relationship between ESG performance and financial performance, this study employs a panel data regression model where annual stock returns are regressed on dataset consisting of annual stock returns, ESG scores, and the STOXX 600 market return. Several studies have employed panel data regression models to analyze the relationship between ESG scores and financial performance metrics over multiple years and across different firms (see, e.g., Ademi & Klungseth, 2022; Alexandra et al., 2024; Lee & Isa, 2023; Rossi et al., 2021). The regression model is structured to test whether ESG performance influences financial performance.

The primary regression model is specified as follows

$$R_{i,t} = \alpha + \beta_1 ESG_{i,t-1} + \beta_2 MKT_t + \epsilon_{i,t}$$

$R_{i,t}$ represents the annual stock return for company i in year t . $ESG_{i,t-1}$ is the lagged ESG score, included to account for possible endogeneity and ensure that ESG scores influence future stock returns rather than contemporaneous returns. MKT_t is the annual return of the STOXX 600 index, included as a control variable to isolate the effect of ESG from broader market trends. α is the intercept, and $\epsilon_{i,t}$ is the error term.

3.3.1 Additional tests

In addition to the main regression model, two complementary analyses were conducted to explore the relationship between ESG performance and financial returns in more detail. First, firms were divided into high and low ESG groups based on the annual ESG score in the sample. This enabled a direct comparison of average stock returns and return variance between the two groups.

Second, the study examined year-over-year changes in ESG scores to assess whether firms with improving ESG performance (i.e., ESG Improvers) achieved better financial outcomes than those whose ESG scores remained constant or declined. These additional tests offer a broader perspective on how ESG dynamics, both in terms of levels and trends, may be linked to financial performance.

4 RESULTS AND DISCUSSION

4.1 Descriptive Statistics

This section presents descriptive statistics for the dataset used in the analysis, which includes annual stock returns, lagged ESG scores, and annual STOXX 600 returns over the period from December 2015 to early 2025. The data encompasses a growing range of publicly listed European mining companies, with coverage increasing over time as ESG reporting improves. Table 4 summarizes the key characteristics of the dataset.

Table 4. Descriptive statistics from the sample data

Variable	Mean	Median	Standard deviation	Min	Max
Annual Stock Return (%)	15.64	3.29	65.62	-91.45	525.58
Lagged ESG Score	3.93	4.05	1.29	0.57	6.55
STOXX 600 Return (%)	4.49	5.98	13.54	-13.24	23.16

Note: The ESG score ranges from 0 to 10, with higher values representing better ESG performance.

The average annual stock return for mining companies is 15.64 %, though the median return of 3.29 % and a standard deviation of 65.62 % indicate substantial variation and positive skewness due to extreme outliers. Returns range from negative 91 % to positive 525 %, suggesting the presence of highly volatile firms in the dataset.

Lagged ESG scores exhibit a mean of 3.93 and median of 4.05 on a 0–10 scale, with a standard deviation of 1.29, indicating moderate dispersion in ESG performance across companies and years. These values suggest that while many firms cluster near the mid-range, there is sufficient variation to support statistical testing. The distribution of the ESG scores is visualized in Figure 1.

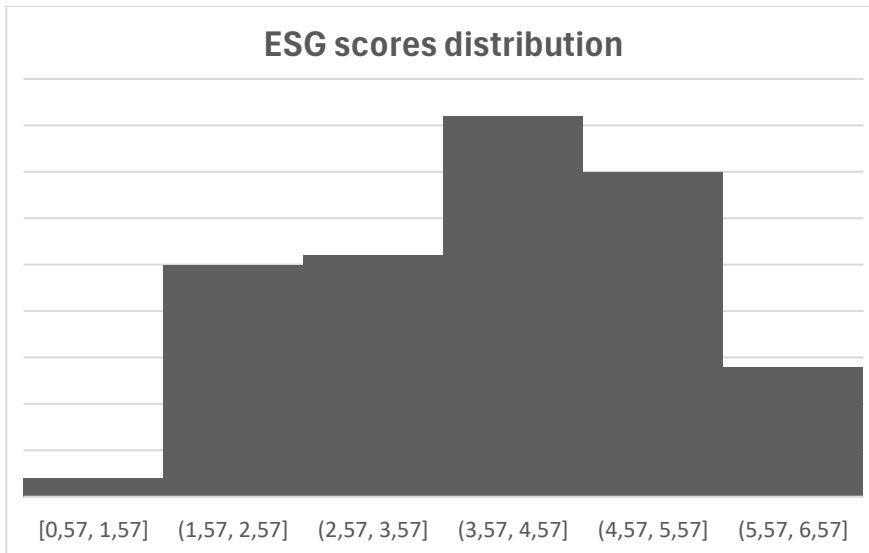


Figure 1. All the ESG scores in the dataset presented in a histogram to visualize the distribution.

The STOXX 600 returns average 4.49 % annually, with a standard deviation of 13.54 %. This reflects the relatively lower volatility of a diversified index compared to individual firm returns, reinforcing its role as a control variable for broader market trends in the regression model.

These statistics confirm that the dataset contains meaningful variation in both financial and ESG-related dimensions, making it suitable for assessing the relationship between sustainability performance and financial returns.

4.2 Correlation Analysis

To examine the linear relationships between key variables prior to regression analysis, a correlation analysis was conducted using all available annual company-level observations. The variables of interest include the lagged ESG scores, the annual stock returns for individual European mining companies and the Annual returns of the STOXX 600 index, used as a control for general market trends.

Table 5. Correlation analysis results

Variables Compared	Correlation Coefficient
Lagged ESG Score and Stock Return	-0.096
Stock Return and STOXX 600 Return	0.094
ESG Score and STOXX 600 Return	0.086

As shown in Table 5 the correlation between stock returns and lagged ESG scores is -0.096 , indicating a very weak and slightly negative linear relationship. This suggests that, in isolation, higher ESG performance is not strongly associated with improved financial outcomes and may even be inversely related, though the magnitude is negligible.

The relationship between stock returns and the STOXX 600 market return is also weakly positive (0.094), which aligns with expectations that company performance is somewhat linked to broader market trends. However, the low value implies that market-wide factors explain only a small portion of firm-specific return variation.

Finally, the correlation between ESG scores and market returns is 0.086 , again very weak. This is consistent with the assumption that ESG scores reflect firm-level sustainability practices rather than being driven by general market conditions.

These low correlation values support the inclusion of all three variables in the regression model. Importantly, the absence of strong correlation between ESG and market return also reduces concerns about multicollinearity, ensuring that both variables can be interpreted independently in the regression context.

4.3 Regression Results

To assess the relationship between ESG performance and stock returns, a panel data regression was conducted using monthly stock returns as the dependent variable. The independent variables included the lagged ESG score and the STOXX 600 market return. The results are summarized in Tables 6 and 7.

Table 6. Regression results

Variable	Coefficient	Std. Error	t-Statistic	p-Value
Intercept	0.346	0.177	1.96	0.052
Lagged ESG Score	-0.054	0.043	-1.25	0.212
Market Return	0.550	0.446	1.23	0.219

Table 7. Regression results

Statistic	Value
R-squared	0.020
Adjusted R-squared	0.006
Standard Error	0.654
Observations	143

The regression results suggest that ESG scores are not significantly associated with annual stock returns among European mining companies during the observed period. The coefficient for the lagged ESG score is -0.054 , but this relationship is statistically insignificant ($p = 0.212$), indicating that ESG performance does not have a measurable linear effect on financial performance in this sample.

The market return, while positive, is also not statistically significant ($p = 0.219$), which may reflect the relatively small sample size and limited variation in annual market movements during the study period.

With an R-squared value of 0.020, the model explains approximately 2% of the variation in annual stock returns. This low explanatory power is not unusual in financial return modeling, particularly when using high-level non-financial indicators such as ESG scores (Dell'Aquila & Ronchetti, 2006; Jianlong et al., 2015).

In sum, the regression analysis does not support a significant relationship between overall ESG scores and annual financial performance within the European mining sector. Further exploration, including group-level comparisons and ESG trend analysis, may provide additional insight into whether ESG performance has a more nuanced or indirect financial effect.

4.4 High- vs. low-ESG firm performance

To further explore the relationship between ESG performance and financial returns, the companies were divided into two groups by their ESG score for every sample year. The mean annual returns and variances of the two groups are depicted in Table 8.

Table 8. Results of the high ESG score and low ESG score groups

Group	Mean Annual Return (%)	Variance	Observations
High ESG	15.44	0.578	71
Low ESG	15.83	0.292	72

The results show that the Low ESG group had a slightly higher average return (15.83%) compared to the High ESG group (15.44%). However, the difference is minimal and likely not economically meaningful. Additionally, the High ESG group exhibited nearly double the return variance, suggesting greater volatility in financial performance.

While more advanced statistical tests could be used to assess whether these differences are significant, the basic comparison here indicates that there is no clear relationship between ESG score levels and average annual stock returns within this sample. The slightly higher volatility in the High ESG group could reflect other unobserved firm characteristics or market factors rather than ESG performance alone.

Overall, this group analysis aligns with the regression and correlation results, reinforcing the conclusion that higher ESG performance does not appear to yield better short-term financial outcomes in the European mining sector.

4.5 ESG score persistence and return comparison

To complement the main analysis, this section investigates the persistence of ESG scores over time and whether changes in ESG performance are associated with differences in financial returns. This allows for an assessment of whether ESG momentum, rather than ESG level alone, plays a role in firm performance.

Companies were classified into two groups based on the year-over-year change in their ESG score. ESG improvers are companies with a higher ESG score than in the previous year. ESG decliners or unchanged are companies whose ESG score declined or remained the same.

The average annual stock return was calculated for each group, along with variance and sample size and are reported in Table 9.

Table 9. ESG score improvers versus ESG score decliners or no change in ESG score

Group	Mean Annual Return (%)	Variance	Observations
ESG improvers	10.01	0.217	76
ESG decliners or no change	1.51	0.153	43

Firms classified as ESG Improvers achieved an average return of 10.01%, compared to only 1.51% for those whose ESG performance declined or did not improve. While return volatility was slightly higher among improvers, the magnitude of the return difference suggests a potential positive link between ESG progress and financial outcomes.

These findings provide some indication that companies with improving ESG performance may earn higher financial returns, at least in relative terms. However, due to the limited sample size and variability in the data, this relationship should be interpreted with caution.

Unlike ESG levels, which did not correlate strongly with performance, this analysis suggests that changes in ESG scores may contain forward-looking information that could potentially be signalling better management, reduced risk, or improved stakeholder trust.

Nevertheless, While promising, the evidence is not yet sufficient to establish causality. Future studies should incorporate longer timeframes and larger samples to validate these findings. and broader industry coverage to validate more robustly.

5 CONCLUSION

This thesis set out to examine the relationship between ESG performance and financial returns in publicly listed European mining companies. Motivated by the growing importance of ESG in both policy and investment decision-making, particularly in environmentally sensitive sectors, the study explored whether firms with stronger ESG profiles are rewarded with higher financial performance.

Drawing from both theoretical literature and empirical analysis, the results suggest that no clear or significant relationship exists between overall ESG scores and annual stock returns in the European mining sector. The regression analysis showed a small, statistically insignificant negative relationship between lagged ESG scores and firm performance. Similarly, the correlation analysis revealed only weak associations among ESG scores, market returns, and company-level returns. A comparison between high- and low-ESG firms further supported these findings, as no meaningful differences in average return or volatility were observed.

However, the analysis of ESG score persistence offered a more nuanced perspective. Companies that improved their ESG scores from one year to the next achieved notably higher average returns than those with stagnant or declining ESG performance. While this difference was not tested for statistical significance due to sample limitations, it indicates that positive ESG momentum may be more financially meaningful than absolute ESG levels.

Overall, these findings align with existing research that highlights the sector-specific and often non-linear nature of the ESG–financial performance relationship. In the mining industry, where ESG compliance often entails substantial upfront costs, the financial benefits of sustainability may emerge more slowly and be influenced by firm-specific or regulatory contexts.

5.1 Implications and future research

The results of this thesis have practical implications for investors, policymakers, and corporate decision-makers. For investors, the findings suggest that a firm's ESG improvement trend may carry more informative value than its absolute ESG rating when evaluating financial potential. For mining companies, the study underscores the importance of maintaining consistent and transparent ESG reporting, not only for regulatory compliance but also for sustaining investor confidence.

Given the data limitations, future research could expand the timeframe or dataset to include more firms and more specific ESG metrics (e.g., individual environmental, social, and governance pillar scores). Additionally, incorporating other financial indicators such as risk measures or cost of capital would provide a broader understanding of ESG's financial relevance in high-impact industries.

In conclusion, while ESG scores alone may not predict short-term financial outperformance in the European mining sector, their evolution over time could serve as a signal of strategic and operational improvement, with long-term financial implications yet to be fully realized.

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AI usage disclosure:

Although the ideas and analysis presented are entirely my own, I used AI-powered tools such as ChatGPT to help with language polishing and proofreading, as well as Scopus AI to support literature searches for my thesis.

Appendices

Appendix 1 Tickers and names of mining companies used in the data

Ticker	Name
NHY NO Equity	NORSK HYDRO ASA
BOL SS Equity	BOLIDEN AB
GLEN LN Equity	GLENCORE PLC
GRNG SS Equity	GRANGES AB
THA SJ Equity	THARISA PLC
NDA GR Equity	AURUBIS AG
RANA NO Equity	RANA GRUBER ASA
ERA FP Equity	ERAMET
GML SJ Equity	GEMFIELDS GROUP LTD
CSTM US Equity	CONSTELLIUM SE
VIO BB Equity	VIOHALCO SA
AMAG AV Equity	AMAG AUSTRIA METALL AG
ELHA GA Equity	ELVALHALCOR SA
FXPO LN Equity	FERREXPO PLC
SSH GR Equity	SUEDWESTDEUTSCHE SALZWERKE A
ATYM LN Equity	ATALAYA MINING COPPER SA
KMR LN Equity	KENMARE RESOURCES PLC
KME IM Equity	KME GROUP SPA
FAR CN Equity	FORACO INTERNATIONAL SA
AFAGR FH Equity	AFARAK GROUP SE
BIOKA GA Equity	BIOKARPET SA
AMA GR Equity	ALTECH ADVANCED MATERIALS AG
NYR BB Equity	NYRSTAR NV
SCRVP BB Equity	SCR-SIBELCO NV - AUC